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How Advertising Effectiveness Depends on Exposure Duration

Millie Elsen

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PROEFSCHRIFT
ter verkrijging van de graad van doctor
aan Tilburg University
op gezag van de rector magnificus,
prof. dr. Ph. Eijlander,

in het openbaar te verdedigen ten overstaan van een
door het college voor promoties aangewezen commissie
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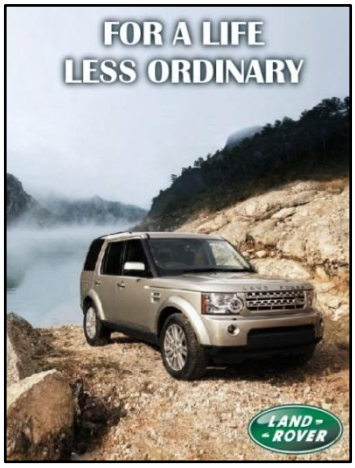
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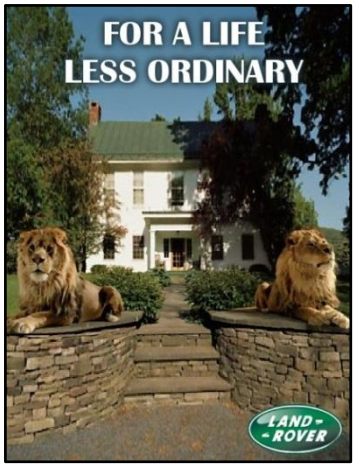
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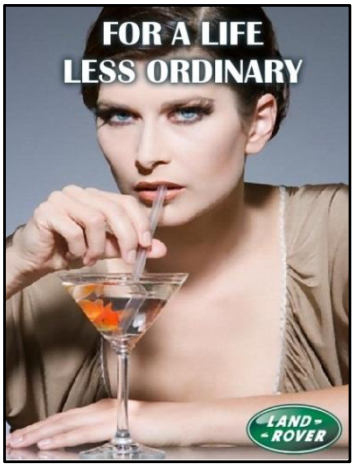
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Chapter 1

May I Have Your Attention, Please?

In many ways, this dissertation resembles a magazine. Finding it in your mailbox may put a smile on your face, as it is a welcome distraction during your workday. Even though you are extremely busy, you might be curious about it, and decide to take a quick look. Just like a real magazine, this dissertation is full of advertising (there are 146 advertisements in total, which is close to the amount of ads in a typical issue of the *Cosmopolitan*). You have to go through a number of ads before you even get to the table of contents. After scanning the first paragraph, you flip through the pages to get a quick impression of what our story is about, and you look a little bit longer at the pictures. Then, you might start reading it more carefully. More likely, however, this is the point where you put it away.

In our faced-paced society, attention is an increasingly scarce resource. Consumers are bombarded with an overabundance of information, far more than they are capable or willing to process. The average number of SKUs in a typical US supermarket increased from about 8000 items in 1970 to over 38000 in 2010.[1] The number of TV channels has also grown explosively over the last years. Standard packages now include over sixty TV channels, as opposed to 19 in 1992.[2] Furthermore, there currently are over 500 million websites on the Internet. In 2010, 294 billion email messages were sent per day (of which almost 90% was spam). In October 2011, "WhatsApp" users crossed a milestone by sending over a billion messages in a single day: 11,475 messages per second.[3] We have access to more information and have more choice than ever before, but unfortunately our days still have only twenty-four hours. The wealth of information makes attention an increasingly scarce resource, and creates a need to allocate attention efficiently to avoid overload.

To navigate through the cluttered world around them including websites, shopping malls, supermarket shelves, magazines, kitchen cabinets and refrigerators, people constantly make rapid decisions based on "thin slices" of information. Research suggests, for instance, that people already form impressions of websites within 50 milliseconds (Lindgaard, Fernandes, Dudek, and Brown 2006). More than 80% of Web surfers spend only a few seconds looking at a website before deciding to move on to the next site (Peracchio and Luna 2006). In supermarkets, consumers faced with large assortments spend no longer than 12 seconds on average at a product

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[1] The Food Marketing Institute (2012), retrieved from http://www.fmi.org/facts_figs/.

[2] Retrieved from http://www.nlkabel.nl/nl/Home/Cijfers-en-feiten/RadioTV.aspx.

[3] Retrieved from http://royal.pingdom.com/2011/01/12/internet-2010-in-numbers/.

Websites last accessed February 4, 2012.

category displayed, and frequently even less than 5 seconds (Dickson and Sawyer 1990).

Ad Exposure in The Real World

Parallel to the enormous growth of the number of brands in the marketplace over the last decades, is the growth in advertising spending. Ads are everywhere. At home, we find ads in magazines, newspapers, on the radio, television and websites, in video games, and receive them via telephone, mail and e-mail, and more. As we walk down the streets, there are billboards, posters, ads on cars, trucks and buses, and storefronts. In bars and restaurants, ads are on walls, flat screens and coasters, and even the restrooms are no longer safe from advertising.

Two general strategies that are used to break through the clutter and retain consumers' attention are to outspend the competition by running more and larger ads, or to outsmart the competition by running more creative ads (Kover 1995; Pieters, Warlop, and Wedel 2002; Pieters, Wedel, and Zhang 2007). Creativity is not limited to ad content: advertisers are also looking for more creative places to reach their audience. Advertising messages on eggs, straws, and airline tray tables are just a few of countless examples. Some companies have even investigated the feasibility of space-billboards that are visible from earth.[4] Ironically, these "solutions" to break through high levels of media clutter generally increase levels of commercial clutter, and make it even more difficult to break through at subsequent attempts (Kover 1995; Story 2007).

This ever-increasing ad clutter poses a serious challenge for advertisers and ad agencies, who want to engage consumers with their ads, create positive impressions and build memory for their ads and brands. The sheer volume of commercial stimuli that simultaneously beg for attention surpasses the processing capacities of any consumer. The great majority of ads in crowded media such as magazines, the Internet and outdoor media receive only a cursory glance, often just enough for the consumer to determine whether the ads are relevant to them and require further processing or not. And even if people decide to stop and take a closer look, attention is only a few seconds at most. Marketing practitioners believe for example that most

[4] Retrieved from http://www.media-awareness.ca/english/parents/marketing/advertising_everywhere.cfm, last accessed March 3, 2012.

people won't look at magazine and banner ads for more than two seconds, and that billboards receive four seconds of a driver's attention at most.[5]

With the recent developments in eyetracking technology, a new stream of literature has emerged aiming to understand visual attention to advertising (see Wedel and Pieters 2007, for a review). In these studies, large amounts of ads are typically tested in their natural context, with exposure duration being self-controlled by the viewer. For example, print ads are placed in magazines with other ads and editorial content (Pieters, Warlop, and Wedel 2002; Pieters and Wedel 2004; Rosbergen, Pieters, and Wedel 1997), banner ads are displayed on websites that participants browse through (Outing and Ruel 2004; Simola et al. 2011), and outdoor advertising is embedded in simulated car driving experiences (Crundall, Van Loon, and Underwood 2006; Edquist et al. 2011).

Average self-controlled exposure durations to ads in these studies are generally brief. Consumers examine magazine ads for less than two seconds on average under highly cluttered conditions (Pieters, Warlop, and Wedel 2002; Pieters and Wedel 2004; Rosbergen, Pieters, and Wedel 1997). In a study by Pieters and Wedel (2004), for example, people freely paged through about 41 ads embedded in their editorial context. The ads attracted attention from almost all participants (96% on average), but retained it for only 1.8 seconds on average, with a range from 0.4 to 5.3 seconds. Similar results of attention in the range of one or two seconds have been obtained for banner ads on websites (Outing and Ruel 2004; Simola et al. 2011). In Simola et al.'s (2011) study, people freely browsed through 32 websites, each displaying two banner ads. If a banner ad captured their attention (which it did in about 33% of the cases), participants looked at it for 1.2 seconds on average if it was located at the top and for 2.1 seconds on average if it was located at the right side of the webpage. Consumers spend even less time on roadside advertising (Crundall, Van Loon, and Underwood 2006; Edquist et al. 2011). Crundall and colleagues (2006) demonstrated that people who were focusing on potential hazards (such as pedestrians and parked cars) while driving spent less than a second on average looking at street-level ads (such as bus stop ads) and only half a second at higher placed ads (such as ads on buildings and billboards).

Perhaps, people look much longer at advertisements if they are more involved or pursue a specific goal, such as to learn new information about the advertised

[5] Retrieved from http://www.outdooradvertisingdc.com/services/billboards/measuring-billboards-effectiveness, http://kapsarovb.com/outdoor-advertising-billboards/, http://www.crucialadvantage.com/tag/banner-advertising/, and http://www.soyouwanna.com/types-business-advertisements-37629.html, last accessed February 4, 2012.

brand. Rosbergen, Pieters, and Wedel (1997) identified three consumer segments exhibiting different patterns of attention to magazine ads under natural viewing conditions, and examined the profiles of these segments. Indeed, the segment of consumers with the highest level of involvement (who considered the product a high-risk product) spent more time on the ads than the other two segments (2.7 seconds *vs.* 0.6 and 1.0 seconds, on average), yet even under high involvement attention lasted no longer than a few seconds. Other research examined attention to ads under specific processing goals (Lohse 1997; Pieters and Wedel 2007; Rayner et al. 2001). Pieters and Wedel (2007) showed for instance that consumers looked longer at magazine ads when they were asked to remember them (5.0 seconds, on average) or tried to learn about or evaluate the advertised products (4.2 seconds) than when they explored it without a particular task in mind (3.6 seconds). Lohse (1997) demonstrated that, when paging through the Yellow Pages looking for businesses to patronize (e.g., "You want to purchase flowers for a friend" or "Your car needs repair"), consumers examined ads for 2.4 seconds on average, with durations ranging from 1.2 seconds for plain listings up to 6.4 seconds for ¼ page ads. Not unexpectedly, attention to ads is longer when people are more involved or pursue a specific goal, yet exposure durations are remarkably brief in absolute sense, in the range of a few seconds.

In sum, the bulk of advertising seems to do most of its effective work on the basis of brief exposures of a few seconds or less. Even under high involvement, self-controlled exposure to ads is surprisingly short. And, if anything, ad exposure is likely to be even shorter in real-life situations, where even more stimuli simultaneously compete for the scarce attention of the consumer and where consumers go about doing their own business.

Ad Exposure in (Academic) Ad Research

Michael Ray (1977) argued already early-on that the exposure conditions of academic advertising research are often different from typical ad exposure situations in the real world, and he questioned the general applicability of ad research because of this. He observed for example that whereas in reality ad clutter is typically high and exposure duration short, ad research is often conducted in contexts with low clutter and long exposure durations. Based on these observations, Ray urged future research to study advertising effectiveness under conditions that better mimic common ad exposure conditions in practice.

To examine whether research has followed up on this call, we conducted a literature search of four top marketing journals (Journal of Consumer Research, Journal of Marketing, Journal of Marketing Research, and Marketing Science) between 2000 and 2010, for all experimental studies on the influence of (print) ad characteristics on consumer responses.[6] Eighty-two articles were located, including 169 studies in total. For each study, information was recorded on exposure control (internal, self-controlled versus external, experimenter-controlled), exposure duration (in sec.) and advertising clutter (the number of ads presented). In addition, information was coded regarding the type of ads used in the studies (text-only, picture-only, or picture-plus-text). Table 1 gives an overview of the selected studies, and table 2 provides the descriptive results.

Exposure control and duration. In 24% of the studies, exposure was controlled by the experimenter. The average forced exposure duration is about 24 seconds (*SD* = 31 seconds), which is a factor five to ten times longer than typical exposure durations in practice. The briefest forced exposure duration is 5 seconds which is about the *maximum* self-controlled duration under cluttered conditions in the study by Pieters and Wedel (2004). The longest duration to a single print advertisement is a whopping 180 seconds. Most studies with external control of exposure show ads for 20 seconds (22%), followed by 10 and 30 seconds (both 17%). Only four of the 36 studies that report exposure durations use durations shorter than 10 seconds. In 27 studies (16%), exposure was internally controlled by the viewer. Only 6 of these studies provide information about the average duration of exposure (*M* = 4.9 sec., *SD* = 7.2 sec.). The remainder of the studies – a striking 60% – does not provide information about the control and duration of ad exposure.

Ad clutter. Ad clutter is the total number of ads a single participant is exposed to in a study's session, including target ads and non-target ("filler") ads, if any. Participants in the examined studies were exposed to about five ads, on average (*M* = 4.8, *SD* = 8.4). The total number of ads presented to a single person ranges between 1 and 65 ads. The distribution is heavily skewed, however. More than half of the studies (54%) presented only a single ad, and only 10% of the studies presented more than 10 ads.

Based on the studies that provide information about the characteristics of ad exposure, one may conclude that exposure conditions in recent academic ad research are still far removed from typical exposure situations in practice. The average exposure duration across these studies (with internal and external exposure control)

[6] We thank Manon Albers for her help in the selection and coding of the articles.

Table 1. *Overview of Exposure Conditions in Ad Research*

Author(s)	Year	Journal	Study	Ad type	Control	Duration (sec.)	Ad Clutter (# ads p.p.)		
							Targets	Fillers	Total
Aaker	2000	JCR		U	EXT	180	1	3	4
Lane	2000	JM		T+P	EXT	30, 45, 60	4, 8	8, 12	16
Wedel and Pieters	2000	MS		T+P	INT	$M < 3$	65	0	65
Cox and Cox	2001	JM		T	EXT	30	0, 1	3, 4	4
Forehand and Deshpandé	2001	JMR	2	T+P	EXT	20	2	3	5
Grier and Deshpandé	2001	JMR		T+P	INT	N/A	2	0	2
Luna and Peracchio	2001	JCR	1	T+P	EXT	20	3	4	7
			2	T+P	EXT	20	3	4	7
Roehm and Sternthal	2001	JCR	1	T	U	N/A	2	0	2
			2	T	U	N/A	2	0	2
			3	T	U	N/A	2	0	2
			4	T	U	N/A	1	0	1
Brumbaugh	2002	JCR		T+P	U	N/A	2	0	2
Krishnamurthy and Sivaraman	2002	JCR	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
Mothersbaugh, Huhmann, and Franke	2002	JCR	2	T+P	INT	N/A	1	5	6
Sengupta and Gorn	2002	JMR	1	T+P	EXT	4, 8	1	6	7
			1A	T+P	EXT	12	1	6	7
			2	T+P	EXT	4, 8	1	6	7
			2A	T+P	EXT	12	1	6	7
Williams and Aaker	2002	JCR	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
			3	T+P	U	N/A	1	0	1
Campbell and Keller	2003	JCR	2	T+P	EXT	13	11	4	15

Table 1 *(continued).*

Author(s)	Year	Journal	Study	Ad type	Control	Duration (sec.)	Ad Clutter (# ads p.p.)		
							Targets	Fillers	Total
McQuarrie and Mick	2003	JCR		T+P	INT	N/A	8	8	16
Spangenberg, Sprott, Grohmann, and Smith	2003	JM	3A	T+P	U	N/A	1	0	1
			3B	T+P	U	N/A	1	0	1
Ziamou and Ratneshwar	2003	JM	1	T+P	INT	N/A	1	0	1
			2	T+P	INT	N/A	1	0	1
			3	T+P	INT	N/A	1	0	1
			4	T+P	INT	N/A	1	0	1
Ahluwalia and Burnkrant	2004	JCR	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
Chakravarti and Janiszewski	2004	JMR	1	T+P	U	N/A	1	1	2
			2	T+P	U	N/A	1	1	2
			3	T+P	U	N/A	1	1	1
			4	T+P	U	N/A	1	1	1
Escalas and Luce	2004	JCR	1	T+P	INT	M = 17, 22	2	0	2
			2	T+P	EXT	15	4	0	4
Grant, Malaviya, and Sternthal	2004	JCR		T	EXT	20, 40	1	0	1
Jain and Posavac	2004	JMR	1	U	INT	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
			3	T+P	U	N/A	1	0	1
Kumar and Krishnan	2004	JCR	1	T+P	EXT	30	8	0	8
			2	T+P	EXT	30	8	0	8
Pieters and Wedel	2004	JM		T+P	INT	M = 1.73	41	0	41

Table 1 *(continued).*

Author(s)	Year	Journal	Study	Ad type	Control	Duration (sec.)	Ad Clutter (# ads p.p.)		
							Targets	Fillers	Total
Appleton-Knapp, Bjork, and Wickens	2005	JCR	1	T+P	EXT	20	20	2	22
			2	T+P	EXT	10	20	4	24
			3	T+P	EXT	10	20	4	24
			4	T+P	EXT	10	20	4	24
Garretson and Burton	2005	JM	1	T+P	U	N/A	2	3	5
			2	T+P	U	N/A	2	3	5
			3	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
Peracchio and Meyers-Levy	2005	JCR	1	T+P	U	N/A	1	3	4
			2	T+P	U	N/A	1	2	3
Petrova and Cialdini	2005	JCR	1	T+P	U	N/A	1	0	1
Wheeler, Petty, and Bizer	2005	JCR	1	T	U	N/A	1	1	2
			2	T	U	N/A	1	1	2
Bakamitsos	2006	JCR	1	U	U	N/A	5	0	5
			2	T+P	U	N/A	1	2	3
Chakravarti and Xie	2006	JMR	2	T+P	U	N/A	1	0	1
			3	T+P	U	N/A	1	0	1
Cox, Cox, and Zimet	2006	JM	1	T+P	U	N/A	8	0	8
Howard and Kerin	2006	JM	1	T+P	INT	N/A	1	6	7
			2	T+P	INT	N/A	1	6	7
			3	T+P	INT	N/A	1	6	7
Jain, Agrawal, and Maheswaran	2006	JCR	1	U	INT	N/A	1	0	1
			2	U	U	N/A	1	0	1
			3	U	U	N/A	1	0	1

Table 1 *(continued).*

Author(s)	Year	Journal	Study	Ad type	Control	Duration (sec.)	Ad Clutter (# ads p.p.)		
							Targets	Fillers	Total
Kang and Herr	2006	JCR	1	T+P	EXT	12	2	10	12
			2	T+P	U	N/A	1	0	1
Keller	2006	JCR	2	T+P	U	N/A	1	0	1
Labroo and Lee	2006	JMR	1	T+P	U	N/A	1	1	2
			2	T+P	U	N/A	1	1	2
Pracejus, Olsen, and O'Guinn	2006	JCR	2	T+P	EXT	30	1	0	1
Roggeveen, Grewal, and Gotlieb	2006	JCR	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
			3	T+P	U	N/A	1	0	1
Smeesters and Mandel	2006	JCR	1	U	U	N/A	4	4	8
			2	U	U	N/A	4	4	8
Thompson and Hamilton	2006	JCR	1A	T+P	U	N/A	1	0	1
			1B	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
Biehal and Sheinin	2007	JM	1	T+P	EXT	U[a]	4	0	4
			2	T+P	U	N/A	5	0	5
Coulter and Coulter	2007	JCR	1	T+P	U	N/A	1	7	8
			2	T+P	U	N/A	1	7	8
			3	T+P	U	N/A	1	7	8
			4	T+P	U	N/A	1, 2	6, 7	8
Darke and Ritchie	2007	JMR	1	T+P	U	N/A	2	0	2
			2	T+P	U	N/A	2	0	2
De Mello, MacInnis, and Stewart	2007	JCR	2	U	U	N/A	2	0	2

Table 1 *(continued).*

Author(s)	Year	Journal	Study	Ad type	Control	Duration (sec.)	Ad Clutter (# ads p.p.)		
							Targets	Fillers	Total
Dimofte and Yalch	2007	JCR	1	U	U	N/A	1	0	1
Escalas	2007	JCR	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
Herzenstein, Posavac, and Brakus	2007	JMR	3	T+P	U	N/A	1	0	1
Kirmani and Zhu	2007	JMR	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
			3	T+P	U	N/A	1	0	1
Labroo and Ramanathan	2007	JCR	1	U	U	N/A	1	0	1
			2	U	U	N/A	2	0	2
Malaviya	2007	JCR	1	T+P	INT	N/A	2, 4	9, 10	12, 13
Mukhopadhyay and Johar	2007	JCR	2	T+P	INT	N/A	1	0	1
			3	T+P	INT	N/A	1	0	1
Puntoni and Tavassoli	2007	JMR	2	T+P	EXT	15[b]	20	0	20
			3	T+P	EXT	15[b]	8	0	8
Huang and Hutchinson	2008	JCR	1	T+P	EXT	20	2	2	4
			2	T+P	EXT	20	2	2	4
			3	T+P	EXT	90	1	0	1
Mogilner, Aaker, and Pennington	2008	JCR	2	U	U	N/A	1	0	1
Noriega and Blair	2008	JM	2	T+P	INT	N/A	1	0	1
Dahl, Sengupta, and Vohs	2009	JCR	1	T+P	EXT	20	1	2	3
			2	T+P	EXT	20	1	2	3
Griskevicius, Goldstein, Mortensen, Sundie, Cialdini, and Kenrick	2009	JMR	1A	T+P	EXT	15	1	0	1
			2	T+P	EXT	15	4	0	4

Table 1 *(continued).*

Author(s)	Year	Journal	Study	Ad type	Control	Duration (sec.)	Ad Clutter (# ads p.p.)		
							Targets	Fillers	Total
Hung and Wyer Jr.	2009	JMR	1	U	U	N/A	1	0	1
			2	U	U	N/A	1	0	1
			3	U	U	N/A	1	0	1
			4	T	U	N/A	1	0	1
Lau-Gesk and Meyers-Levy	2009	JCR	1	T+P	INT	N/A	1	0	1
			2	T+P	INT	N/A	1	0	1
			3	T+P	INT	N/A	1	0	1
Ng and Houston	2009	JMR	4	T+P	U	N/A	1	0	1
			5	T+P	U	N/A	1	0	1
Small and Verrochi	2009	JMR	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
			3	T+P	U	N/A	1	0	1
			4	T+P	EXT	5	10	0	10
			5	T+P	EXT	5	10	0	10
Swaminathan, Stilley, and Ahluwalia	2009	JCR	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
White and Peloza	2009	JM	1	U	U	N/A	1	0	1
			2	U	U	N/A	1	0	1
			3	U	U	N/A	1	0	1
			4	U	U	N/A	2	0	2
			5	U	U	N/A	1	0	1
Wilcox, Kim, and Sen	2009	JMR	3	T+P	U	N/A	1	0	1
Zhang, Wedel, and Pieters	2009	JMR		T+P	INT	$M = 0.18$	U	0	U

Table 1 *(continued).*

Author(s)	Year	Journal	Study	Ad type	Control	Duration (sec.)	Ad Clutter (# ads p.p.)		
							Targets	Fillers	Total
Agrawal and Duhachek	2010	JMR	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
			3	T+P	U	N/A	1	1	2
			4	T+P	U	N/A	1	0	1
			5	T+P	U	N/A	1	0	1
Aribarg, Pieters, and Wedel	2010	JM		T+P	INT	*M* = 2.59	48	0	48
Cox, Cox, and Mantel	2010	JM		T+P	INT	N/A	1	0	1
Dempsey and Mitchell	2010	JCR	1	T+P	U	N/A	6	0	6
			2	T+P	U	N/A	6	0	6
Elder and Krishna	2010	JCR	2	U	INT	N/A	1	0	1
			3	U	U	N/A	1	0	1
Goode, Dahl, and Moreau	2010	JMR	1	T+P	EXT	10	1	0	1
			2	T+P	EXT	10	1	0	1
			3	T+P	EXT	10	1	0	1
Hong and Sternthal	2010	JMR	3	U	U	N/A	1	0	1
			4	U	U	N/A	1	0	1
Lee, Keller, and Sternthal	2010	JCR	3	T+P	U	N/A	1	0	1
			4	T+P	U	N/A	1	0	1
Liu and Smeesters	2010	JMR	3	T+P	EXT	U[a]	1	0	1
Nielsen, Shapiro, and Mason	2010	JMR	1	T+P	EXT	U[a]	8	16	24
			2	T+P	EXT	U[a]	8	16	24
			3	T+P	U	N/A	8	16	24

Table 1 *(continued).*

Author(s)	Year	Journal	Study	Ad type	Control	Duration (sec.)	Ad Clutter (# ads p.p.)		
							Targets	Fillers	Total
Pieters, Wedel, and Batra	2010	JM		T+P	INT	*M* = 2.12	U[c]	0	U[c]
Wan, Rucker, Tormala, and Clarkson	2010	JMR	3	U	EXT	30	1	0	1
Wiles, Jain, Mishra, and Lindsey	2010	MS	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	2	0	2
Xu and Wyer	2010	JCR	1	T+P	U	N/A	1	0	1
			2	T+P	U	N/A	1	0	1
Yorkston, Nunes, and Matta	2010	JM	3	T+P	U	N/A	1	0	1

Note – Ad type: T = text, P = pictorial; Control: INT = internal control (free viewing), EXT = external control (forced exposure); U = unknown.
[a]Exposure duration is indicated as "set time", "manageable time" or "sufficient time". The exposure duration is externally controlled and forced, but the exact duration is unknown.
[b]Participants were given approximately 30 sec. per page. Each page contained two advertisements.
[c]Participants were exposed to all ads from four magazines.
(Only the articles that are also referred to elsewhere in the dissertation are included in the reference list.)

Table 2. *Exposure Conditions in Ad Research: Descriptives*

Exposure characteristic		%	N
Exposure control	Internal	16.1	27
	External	23.8	40
	Unknown	60.1	101
Exposure duration (in sec., in studies with external exposure control)	5	5.6	2
	6	5.6	2
	10	16.7	6
	12	8.3	3
	13	2.8	1
	15	13.9	5
	20	22.2	8
	30	16.7	6
	45	2.8	1
	90	2.8	1
	180	2.8	1
	M = 23.9 sec. (*SD* = 30.7)		36
Ad clutter (total # ads p.p.)	1	54.2	90
	2	11.4	19
	3	2.4	4
	4	4.8	8
	5	3.0	5
	6	1.8	3
	7	5.4	9
	8	6.0	10
	10	1.2	2
	12	0.6	1
	13	0.6	1
	15	0.6	1
	16	1.2	2
	20	0.6	1
	22	0.6	1
	24	3.6	6
	41	0.6	1
	48	0.6	1
	65	0.6	1
	M = 4.8 ads (*SD* = 8.4)		168

is about 21 seconds, which is more than 5 times longer than exposures under more natural conditions. Moreover, in most studies participants are exposed to a single ad, ignoring the fact that ads usually compete with other stimuli for the attention of the consumer. Thus, although these studies provide important insights, they may not permit valid inferences about ad effectiveness under brief exposure conditions that prevail in practice, and their results may thus not apply to the majority of ads.

The majority of studies does not provide information regarding the exact ad exposure conditions, however. Assuming that self-paced exposure by participants is the default and that self-paced exposures are likely to be shorter than the forced exposures in the examined studies, the true average exposure duration is probably shorter than 21 seconds. Self-controlled exposure durations are typically in the range of a few seconds when large amounts of ads are tested in their natural environment (Edquist et al. 2011; Pieters, Warlop, and Wedel 2002; Simola et al. 2011). However, ad clutter is surprisingly low in the studies that do not report exposure conditions: 83% of the studies presented only one or two ads (as compared to 22.5% of the studies with forced exposure). Under such low levels of clutter, average self-paced exposures are unlikely to be very short. Based on the average self-controlled exposure duration of 5.24 seconds that we found in our own study with 48 ads (in chapter 2), we would predict them to last at least 5 seconds, which is similar to the minimum forced duration.

The Gap between Research and Practice

Most academic advertising research examines effects of attentive ad processing, that is, when consumers direct focal attention to the ad. Based on our review of the exposure conditions we believe it is reasonable to assume that ad exposures within this stream of research are rarely shorter than 5 seconds.

A very different and much smaller stream of research has focused on the effects of subliminal ad exposures (Dijksterhuis, Aarts, and Smith 2005; Moore 1982). Here, ad messages are typically presented so briefly or in such a degraded form that they cannot be perceived, even if attention is directed at them. There is no absolute exposure duration at which stimuli move from being supraliminal to subliminal. The threshold is individual-specific and varies depending on many factors such as the size and complexity of the stimulus and masking. Most studies on subliminal persuasion use exposure durations of about 30 milliseconds at most (e.g., 10 msec., Bermeitinger et al. 2009; 23 msec., Karremans, Stroebe, and Klaus 2006; 16 msec., Strahan, Spencer,

and Zanna 2002). Subliminal advertising first came to the public's attention in the 1950s. The idea that subliminal messages could affect one's behavior without awareness frightened people and raised a public furor, which has led Australia, Britain and the United States among others to ban the practice (Karremans, Stroebe, and Klaus 2006). Recently, however, the study of subliminal perception has gained renewed interest (Bermeitinger et al. 2009; Karremans, Stroebe, and Klaus 2006), reviving the debate on the possibilities and boundaries of subliminal advertising (Dijksterhuis, Aarts, and Smith 2005).

Finally, insights are also accumulating on preattentive ad processing (Janiszewski 1988; 1993; Nielsen, Shapiro, and Mason 2010; Shapiro, Heckler, and MacInnis 1997). Motivated by increasing levels of advertising clutter and consumers' inability and lack of motivation to process all advertisements they encounter, this stream of research aims to understand potential effects of ad messages that are outside consumers' focus of attention. Research within this stream demonstrates that while attention is focused on a primary task (such as reading a magazine article), secondary information (such as an advertisement) that is present but ignored may be processed at a preattentive level. At subsequent encounter, preattentively processed ads and brands are processed more fluently, which provides a feeling of familiarity. Being unaware of its actual source, consumers might misattribute fluency to liking, and evaluate the ad or brand more positively (Janiszewski 1993; Shapiro, MacInnis, and Heckler 1997).

Taken together, a great deal is known about the effectiveness of individual ads that are shown (often in isolation) for long exposures from about 5 to 30 seconds or even longer, and insights are also accumulating on the effects of preattentive processing and subliminal ad exposures of up to 30 milliseconds. Surprisingly, little is known about what happens in between such extremely short and extremely long exposure durations, from a single glance up to a couple of seconds. This is ironic given the evidence that ad processing generally proceeds at a time scale that falls exactly in between these two extremes. Attention to ads usually lasts a few seconds at most in practice, but little to nothing is known about the comprehension processes that take place during such brief exposures and about their downstream effects (Pieters and Wedel 2012). This dissertation aims to contribute to closing this knowledge gap.

Ad Typicality and Exposure Duration

Even though all information in print ads is available at once, consumers cannot process it all at once. As information accumulates from the first glance onwards, consumers come to understand what type of product is being advertised and what the ad tells them about that product. Yet, some ads communicate faster than others. Through experience, consumer have acquired memory representations of typical ads, which are primarily organized at the product category level (Goodstein 1993). Typical ads display objects and scenes that are expected for the category, such as a car on a mountain road in a car ad or a woman with long, shiny hair in an ad for a hair care product. Building on recent developments in the object and scene perception literatures (Grill-Spector and Kanwisher 2005; Oliva 2005), recent research has shown that due to these prior memory representations, typical ads require no more than a brief glance for consumers to comprehend what type of product is being advertised (Pieters and Wedel 2012).

Atypical ads differ from the memory representations that consumers have of ads in a particular product category, and require more time to comprehend. Designing atypical ads is a popular creative strategy, because the initial uncertainty about atypical ads ("What is it?") is believed to capture attention (Goldenberg, Mazursky, and Solomon 2005; Pieters, Warlop, and Wedel 2002), and the subsequent reduction of uncertainty is assumed to be particularly rewarding (Mandler 1982; Smith et al. 2007).

The present dissertation examines the role of comprehension processes in attitude formation and memory, and how this crucially depends on the duration of exposure. It zooms in on effects of ad typicality, because of the very different comprehension processes that typical and atypical ads engender. Whereas ad research has focused on message comprehension and its downstream effects (Jacoby and Hoyer 1989; Mick 1992; Rathneswar and Chaiken 1991), we examine the role of product comprehension under brief exposure conditions that are common in practice. Knowing what is being advertised is an important first step in ad comprehension, which has received surprisingly little attention in advertising theory and research.

Our research fits into an emerging stream of literature that is aimed at understanding the influence that "thin slices" of information have on judgment and decision making (Ambady and Rosenthal 1993; Peracchio and Luna 2006; Pieters and Wedel 2012). In the present studies, the exposure duration is cut into "thin and thicker slices" from a mere 100 msec. up to 10 seconds. We demonstrate that much advertising processing happens fast within the first moments of exposure with

important implications for attitude formation and memory retrieval, and that small differences in exposure duration even within the range of a few seconds may have substantial effects on ad outcomes.

Outline of the Dissertation

In three empirical chapters, we investigate how the effectiveness of typical and atypical depends on the duration of exposure.

In Chapter 2, we examine attitudinal effects of brief and longer exposures to typical and atypical ads. Three studies demonstrate that attitudes are critically dependent on the exposure duration and the specific type of atypicality, and show how the effects are mediated by feelings of knowing what is being advertised.

Chapter 3 extends to memory effects. It distinguishes between recall and recognition memory, and shows that these are influenced by ad typicality and exposure duration in very different ways. The findings show the advantage of being typical ("fitting in") in recall, the advantage of being atypical ("standing out") in recognition, and how these depend on the duration of exposure. Furthermore, they reveal the mediating influence of product comprehension in recall (but not in recognition) after brief exposures.

In chapter 4, we examine joint effects of exposure duration and exposure frequency. Here, we move beyond the effects of single ad exposures and examine attitudinal wear-in and wear-out of advertising across repeated exposures of brief and long durations. The studies demonstrate the importance of comprehension in attitudinal wear-in and the influence of recognition memory in attitudinal wear-out of advertising, and the crucial role of exposure duration relative to frequency in attaining high levels of comprehension and memory.

Finally, chapter 5 summarizes and integrates the empirical findings, discusses the implications and provides directions for future research.

Chapter 2

Attitude

Attitudes for ads critically depend on exposure duration. After a brief glance, attitudes for ads that represent a particular product category ("typical ads") and attitudes for ads that *appear* to represent a particular category but actually do not ("false front ads") are more positive than attitudes for ads that are not typical for any category ("mystery ads"). When exposure duration prolongs attitudes stay high for typical ads, but sharply improve for mystery ads, and deteriorate for false front ads. These effects are due to feelings of knowing what is advertised, and reflect rapid confirmation, expansion and disconfirmation of ad comprehension, respectively.

Imagine being exposed to an ad that shows a four-wheel drive in a rugged outdoor scene, to another ad that displays a basket in a rainbow-lit field, and to yet another ad that pictures a classy lady misting her face from a container in her hand. What do these ads communicate and how much do you like them? The answer to these questions may depend on how long the exposure to these ads lasts.

People cannot closely attend to and deeply process each of the numerous ads that they are daily exposed to; it would quickly overload the capacity of their cognitive system. Therefore, they have learned to rapidly identify the global meaning of ads in terms of the products and brands that are being advertised (Oliva 2005; Pieters and Wedel 2012). The first ad was probably for a car, the advertised product in the second ad was less clear, but the third ad was most likely for a fragrance. Knowing what is being advertised is an early stage in advertising comprehension (Fazio, Herr, and Powell 1992; Hoyer and MacInnis 2009). It helps to establish which ads are relevant to goal pursuit and which are not. The question is what the implications of such early comprehension are for attitude formation, and what would happen when exposure to the ads were longer.

A stream of research has examined the later stages of advertising comprehension (Greenwald and Leavitt 1984; Jacoby and Hoyer 1989; Mick 1992; Morris, Hastak, and Mazis 1995; Rathneswar and Chaiken 1991). From this research much is known about the effects of advertising comprehension on attitudes after long exposure durations of 20 seconds or more (Heckler and Childers 1992; Lee and Mason 1999; Meyers-Levy and Malaviya 1999; Roehm and Sternthal 2001). Yet, due to increasingly high levels of media clutter the majority of ads receives much less attention, usually a few seconds only, and often not more than a single glance (Pieters, Wedel, and Batra 2010; Ray 1977). These ads rely for their effect on early comprehension and attitude formation processes. Sadly, little is known about ad comprehension and attitude formation during the early stages of ad exposure (Peracchio and Luna 2006; Pieters and Wedel 2012). The present research aims to contribute to closing this knowledge gap. It focuses on comprehension and attitude formation during exposures that last from a single brief glance to a few seconds, and how three kinds of ad typicality influence these processes.

We will test the idea that attitudes for ads critically depend on exposure duration and that this is due to early comprehension processes. We predict that immediately upon exposure, attitudes for ads that are typical for a particular product category ("typical ads") and for ads that *appear* to be typical for a particular category but actually are for another category ("false front ads") are already more positive than

ads that are not typical for any category ("mystery ads"). We predict that when exposure duration prolongs, attitudes will become more positive for mystery ads, more negative for false front ads, and stay positive for typical ads. We expect these effects to be due to immediate and later feelings of knowing what is being advertised, independent of the accuracy of knowing and independent of what is actually being advertised. Support for these predictions would provide new insights into rapid attitude formation during ad exposure and how ad comprehension influences this from the first glance onwards.

The next sections describe the theory on which our predictions rest. Then, we present the results of three studies to test them.

Ad Comprehension and Attitude Formation

Ad comprehension involves the reduction of uncertainty about the advertised product and brand ("What is it?") and message ("What about it?"). Consumer behavior theory has made this distinction between early categorization processes and later message comprehension processes in understanding (Hoyer and MacInnis 2009), but advertising research has focused on the later stages of message comprehension that take place during longer exposures (Jacoby and Hoyer 1989; Mick 1992; Rathneswar and Chaiken 1991). Product comprehension (i.e., knowing what is being advertised) is an early stage in ad comprehension. It helps people to quickly determine the relevance of ads to current goal pursuit, and is often a prerequisite for understanding the ad's message (Fazio, Herr, and Powell 1992; Hoyer and MacInnis 2009).

The global meaning (or "gist") of ads in terms of the categories it belongs to may be rapidly understood. It may involve the scenes in the ad, e.g., fields or forests, indoor or outdoor (Greene and Oliva 2009; Oliva 2005), and the objects it contains, e.g., baskets or bottles (Grill-Spector and Kanwisher 2005), including the products and brands that are being advertised (Pieters and Wedel 2012). Information about the global meaning of complex scenes such as ads rapidly accumulates during exposure to them from the very first moment onwards (Bacon-Macé et al. 2005; Green and Oliva 2009). Research in the related domain of knowledge testing ("What is the capital of Latvia?") finds that people generally monitor this accumulation of information and experience a feeling of knowing the more and faster information becomes available (Koriat 1995). This feeling of knowing is a form of subjective knowledge (Alba and Hutchinson 2000) that people rely on in judgment and decision-making. It is efficient to do so because feelings of knowing come to mind quickly and are often diagnostic

for objective knowledge which in itself tends to become available slower or not at all (Koriat 1995). Subjective knowledge is "calibrated" when it is consistent with objective knowledge (Alba and Hutchinson 2000). Yet, there are situations when subjective knowledge is miscalibrated. Then, people are misled by false cues to believe that they know something that they actually do not know (Koriat 1995; 2008). Prior research has found significant levels of miscomprehending the message in magazine advertisements, even after long exposure durations (Jacoby and Hoyer 1989). We are not aware of research on the calibration of comprehending the meaning of ads after short exposure durations.

Attitude Formation

Product comprehension can influence attitude formation in at least two ways. First, the outcome of the comprehension process can influence attitude formation during ad exposure. That is, the specific product category that people believe the ad is for, e.g., a fragrance, activates an attitude that is associated with that product category. Attitudes towards ads should be more positive when the attitude towards the advertised category is positive rather than negative. This is consistent with findings in person perception research that people tend to categorize others upon exposure to them, which triggers schema-based affect associated with the category (Fiske and Neuberg 1990).

Second, the comprehension process itself, independent of the outcome, can influence attitude formation. Early on during exposure, information about ads is limited and uncertainty about their meaning is high. People generally dislike uncertainty in communication, in particular early on (Berger and Calabrese 1975; Kunda and Spencer 2003). In line with this, Kruglanski and Webster (1996) observe that especially under time pressure, people have a need for "non-specific knowledge", that is, to have any knowledge as long as it is definitive. The feeling of knowing what is being advertised serves this purpose. It signals that uncertainty is reduced and satisfies the need to comprehend and know (Kruglanski 1989; Kunda and Spencer 2003). Therefore this feeling is pleasurable, which should contribute to positive attitudes in its own right. That is, the feeling of knowing that the ad is for a fragrance, regardless of one's attitude towards fragrances and even if that knowledge may be miscalibrated, is likely to result in a more positive attitude towards the ad. Although attitude effects of feelings of knowing have not yet been studied (Alba and Hutchinson 2000; Koriat 2008), research on conceptual fluency suggests them. This research has shown that contextual priming of the meaning of words or brands

increases the feeling of knowing them (Rajaram and Geraci 2000) and that it improves attitudes towards them (Lee and Labroo 2004).

Based on this analysis, we predict that the feeling of knowing what ads are for improves attitudes independent of the influence of product category affect. Moreover, because people tend to rely on their feeling of knowing, its effect on attitudes should be independent of the factual accuracy of knowing what is being advertised. The effect of the feeling of knowing should be strongest early on during ad exposure, when little other information about the ad is available and people have to rely on their feelings. When exposure duration prolongs, more information about the advertised product accumulates and more other information about the ad becomes available as well. Then, the feeling of knowing becomes increasingly better calibrated, and its attitudinal effects should become smaller during these longer exposure durations. Although direct evidence for this prediction is lacking, research on stereotype application is consistent with this. It has found that people tend to use their initial categorizations, such as gender stereotypes, to judge the character of others, except when more specific, individuating information about the others is available, such as their behaviors (Kunda and Spencer 2003).

From the range of potentially influential ad characteristics (Mick 1992; Meyers-Levy and Malaviya 1999; Rathneswar and Chaiken 1991; Roehm and Sternthal 2001), we believe that ad typicality plays a special role because it may directly affect product comprehension and thereby attitude formation during ad exposure.

Ad Typicality Effects

Typical ads are representative of the ads in a particular product category. People have strong memory representations of such ads (Goodstein 1993) based on the similarities between ads in the category (Loken and Ward 1990), for instance, in the objects and scenes that they display. These representations influence expectations of what ads in the category normally look like. The first ad in the opening example was a car ad. It is one of the typical ads that we used in study 3 (appendix A shows the ads from all studies).

Atypical ads do not match expectations of what ads for a particular product category look like. We distinguish two broad kinds, namely “mystery ads” and “false front ads”.

Mystery ads are not representative for any *particular* product category. They contain objects and scenes that do not instantly call a specific product category to mind. Initially upon exposure to them, there is uncertainty about what is being advertised in these ads, which is reduced upon longer exposure (Fazio, Herr, and Powell 1992). The second ad in the opening example, displaying the wicker basket in the field, does not immediately call a specific product category to mind. Only after looking longer it turns out to be for potato chips made from the potatoes in the basket. It is one of the mystery ads used in study 2 (see appendix A).

False front ads, in contrast, are designed to initially show similarity to typical ads of *another* category than the one they actually advertise. The third ad in the opening example, showing the lady misting her face, initially appears to be for a fragrance. Yet, after looking longer, the container in her hand actually is a soft drink can, and the copy text reads "Sexy drink." This is a false front ad that uses the "front" of the fragrance category to advertise a soft drink. It is one of the false front ads used in study 1 (see appendix A).

The two kinds of ad atypicality, mystery and false front, are common creative strategies in advertising, each encompassing various specific tactics (Goldenberg, Mazursky, and Solomon 1999; Smith, MacKenzie, Yang, Buchholz, and Darley 2007). They are frequent recipients of creativity awards as illustrated by a content analysis of 150 magazine ads that had won an EPICA creativity award between 2005 and 2009 (www.epica-awards.com; two independent coders, Cohen's kappa = .664, $p < .001$). Of these ads, 75% were classified as mystery ad, and 10% as false front ad. Atypical ads thus account for a total of 85% of these award-winning ads.

Predictions

We predict that the three kinds of ad typicality have distinct effects on product comprehension and attitude formation from brief to longer exposures. Table 1 summarizes the predictions.

Exposure to typical ads activates a process of *confirmation* of comprehension, which leads to relatively positive and stable attitudes from brief to longer exposures. That is, the gist of typical ads in terms of what is being advertised can be comprehended almost immediately upon exposure to them (Pieters and Wedel 2012). The resulting feeling of knowing is calibrated with high factual accuracy of knowing. This feeling of knowing is liked, which leads to positive attitudes independent of the advertised category and the accuracy of knowing. The additional information that accumulates during longer exposure durations confirms the initial feeling of knowing. This process of confirmation of comprehension affirms the predictability of the ads

and satisfies the need to know and understand. Therefore, attitudes for typical ads should retain their positive initial level (table 1, top line), perhaps to eventually taper off due to tedium.

Exposure to mystery ads activates a process of *expansion* of comprehension, which leads to initially relatively negative but improving attitudes from brief to longer exposures. The product in mystery ads cannot be immediately comprehended upon exposure to them. The resulting uncertainty and feeling of *not* knowing is calibrated with low factual accuracy of knowing the advertised product. The feeling is disliked (Berger and Calabrese 1975; Kunda and Spencer 2003) which leads to negative attitudes, independent of the advertised category and the accuracy of knowing. The additional information that accumulates during longer exposure durations raises the feeling of knowing what is being advertised, which remains calibrated because factual accuracy of product comprehension also improves. This process of expansion of comprehension satisfies the motivation to know and understand. Therefore, the initially relatively negative attitudes for mystery ads improve when exposure duration prolongs (table 1, middle line).

Exposure to a false front ad activates a process of *disconfirmation* of initial comprehension, which leads to relatively positive but deteriorating attitudes from brief to longer exposures. That is, immediately upon exposure to them, people have a feeling of knowing what is being advertised in false front ads. The feeling of knowing is liked which leads to positive attitudes towards the ad and brand, independent of the advertised category and the accuracy of knowing. Yet, this initial feeling of knowing the ad is miscalibrated with low factual accuracy of knowing. The additional information that accumulates when exposure duration prolongs disconfirms that feeling of knowing and reveals the initial miscalibration. People generally dislike cognitive discrepancies (Harmon-Jones 2000). They frustrate the motivation to know and understand, and the required switch in cognitive perspective is effortful, which is disliked. Therefore, the initially positive attitudes for false front ads should deteriorate when discrepant information becomes available after longer exposure durations (table 1, bottom line).

Joint support for the predictions would reveal that attitudes for ads critically depend on the duration of exposure to them: after brief exposures, attitudes for typical and false front ads would be more positive than for mystery ads, but after longer exposures, attitudes for typical and mystery ads would be more positive than for false front ads, with typical ads doing well both early and later on. It would indicate how the feeling of knowing, independent of its accuracy and product

category affect, mediates these effects of ad typicality on attitudes in particular early on during exposure. We conducted three studies to test the predictions.

Table 1. *Overview of Predictions*

	Product comprehension					Attitude formation	
	Feeling of knowing		Accuracy of knowing		Comprehension process during exposure		
	Brief exposure	Long exposure	Brief exposure	Long exposure		Brief exposure	Long exposure
Typical ads	High	High	High	High	Confirmation	Positive	Positive
Mystery ads	Low	High	Low	High	Expansion	Negative	Positive
False front ads	High	High	Low	High	Disconfirmation	Positive	Negative

Note – Positivity and negativity of attitudes is relative to each other, rather than in an absolute sense.

Study 1

Study 1 examines the effect that ad typicality has on attitudes, and how this depends on exposure duration. It tests whether ad typicality effects are mediated by the feeling of knowing, independent of the extent to which the feeling is calibrated and independent of product category affect, and whether this mediated effect is stronger early on.

Method

Participants and Design. Eighty-nine paid undergraduate students (M_{age} = 20.22, *SD* = 3.07, 27 females) were randomly assigned to a condition of a 4 x 3 mixed design, with exposure duration (100 msec., 500 msec., 2 seconds, and 10 seconds) as between-subjects factor and ad typicality (typical, mystery, and false front ads) as within-subjects factor.

Exposure duration has four levels that were selected based on the following reasoning. A 100-msec. exposure is less than the duration of a single eye fixation so that the eyes cannot move, but well above the awareness threshold and long enough to comprehend the gist of common natural scenes (Greene and Oliva 2009), objects (Grill-Spector and Kanwisher 2005) and typical ads (Pieters and Wedel 2012). A 500-msec. exposure is sufficient to make at least two consecutive eye fixations, which enables information integration from different words, objects and/or scene locations (Rayner and Castelhano 2007). This is expected to be the minimum number of fixations to comprehend what is being advertised in atypical ads to either solve the

mystery or switch perspectives from the false front to the actual product. A 2-second exposure is about the average time that print ads are attended to under cluttered conditions in practice (Pieters, Wedel, and Batra 2010). A 10-second exposure is comparable to the durations used in ad research (Meyers-Levy and Malaviya 1999), but longer than common exposure durations in practice (Ray 1977).

Participants saw twelve target ads: four replicates for each ad type in the product categories beverages, food, fragrances, and tooth care. False front ads were for one of these categories but used the front of another of the categories or of cell phones or hair care. Twelve non-target ads were added to increase clutter, yielding a total of 24 ads.

Stimulus Development. Ads in this and the next studies were specially designed or adapted versions of existing ads, followed by pretesting. The ads are in appendix A. Typical ads contained objects or scenes that are common and characteristic for ads for the target product categories (first column in appendix A). Mystery ads displayed objects and scenes that were not typical for these product categories or for any other commonly advertised product category (second column in appendix A). False front ads displayed objects and scenes that were typical for another product category than the advertised one (third column in appendix A). All ads contained a pictorial, text (headline and/or tagline), and brand (name and/or logo).

Two pretests established that ads for the three types differed in typicality and its consequences, but not in other key aspects (see table A4 in appendix A). In the first pretest, a sample of undergraduate students (N = 45) rated the target ads on typicality ("This ad looks like other ads for this kind of product" and "I instantly know what kind of product is advertised", both with 5-point response scales from (1) *certainly not* to (5) *certainly so*), creativity ("This ad is …" on 5-point from (1) *not original* to (5) *original*), and comprehensibility ("This ad is … to comprehend," on 5-point from (1) *easy* to (5) *difficult*, and "It takes some time before I comprehend this ad" on 5-point from (1) *certainly not* to (5) *certainly so*). As intended, typical ads looked more like other ads in the same category (M = 4.24; $F(1, 9) = 28.44$, $p < .01$) and were easier to identify (M = 4.53; $F(1, 9) = 68.75$, $p < .01$) than mystery ads (M = 2.03 and 2.29) or false front ads (M = 2.18 and 2.19), with the latter two not differing from each other (Fs < 1). Mystery and false front ads were judged to be equally original (M_{mystery} = 3.88 and $M_{\text{false front}}$ = 3.68, F < 1) equally difficult to comprehend (M_{mystery} = 3.22 and $M_{\text{false front}}$ = 3.08, F < 1), and to require as much time (M_{mystery} = 3.32 and $M_{\text{false front}}$ = 3.16, F < 1), but were judged to be more original (M = 1.77, $F(1, 9) = 30.09$, $p < .01$), more difficult to comprehend (M = 1.76, $F(1, 9) = 122.64$, $p < .01$), and to require more time

(M = 1.58; $F(1, 9)$ = 190.25, p < .001) than typical ads. In additional pretests, new samples of students rated the advertised brands on familiarity (5-point, from (1) *unfamiliar* to (5) *familiar*; N = 21), and the ads on visual appeal (two 5-point items, from (1) *ugly* to (5) *beautiful*, and from (1) *unattractive* to (5) *attractive*, α = .89; N = 19) and picture-text relevance (5-point, from (1) *not at all* to (5) *perfect*; N = 20). Visual complexity of the ads was assessed using the file-size of the JPEG-compressed ad image (Pieters, Wedel, and Batra 2010). As intended, there were no differences between ad types in these measures (Fs < 1.9, ps > .2).

Procedure and Measures. Data collection took place individually on computers in the behavioral lab. Participants were instructed to identify each advertised product as fast and accurately as possible, and to evaluate each ad.

Data collection in all three studies had the same general set-up (Bacon-Macé et al. 2005; Grill-Spector and Kanwisher 2005). First, a blank screen with a fixation cross (900 msec.) was shown to ensure similar viewing positions across ads and conditions. Then a target ad was shown for 100 msec., 500 msec., 2 seconds or 10 seconds depending on the exposure condition. A backward mask immediately appeared after this for 80 msec. to prevent further visual processing.

To assess product comprehension, participants indicated the advertised product from six product category names that appeared on the screen (four target categories, and cell phones and hair care). Accuracy of knowing was determined from these responses. Response latencies were computer-recorded times between onset of the product question and the response. We used these response latencies as measures of the feeling of knowing, which is validated by extensive work by Koriat and colleagues (Koriat 2008; Koriat and Ackerman 2009). Shorter response latencies indicate feelings held with more certainty. Participants indicated their attitude on a 5-point scale: "How bad/good do you consider the ad to be?" Lastly, a black screen was shown for 300 msec. to signal the end of a trial, after which the next trial began. This procedure was repeated for all ads, with ad order counterbalanced. Two practice trials familiarized participants with the task.

Analysis. We developed a Bayesian model to test the predictions and account for the key aspects of the data generating process. The advantages of the Bayesian approach have been extensively documented in that it allows one to handle the measurement scale of the variables appropriately, to accommodate individual differences, and properly estimate and test mediation effects (Rossi and Allenby 2003; Zhang, Wedel, and Pieters 2009). Our model is a latent variable path model to estimate moderated mediation analysis given the other data characteristics (Preacher, Zyphur, and Zhang 2010). That is, it accommodates the multi-level data structure that

arises from the fact that ad typicality (X) is manipulated within-subjects and exposure duration (W) between-subjects, and the heterogeneity in participants' responses to the multiple ads for each ad type. It handles multiple mediators (M) and outcomes (Y) that are on different measurement scales (M_1: accuracy is binary, M_2: latency is log-normal, Y: ad attitude is ordinal), and includes as control variables (C) the product categories that participants indicate to be advertised. Appendix B gives details about the model and estimation procedure. Prior to the analyses, ad typicality was coded through two orthogonal contrasts, namely X_1: typical = ⅓, mystery = ⅓, false front = -⅔, and X_2: typical = .5, mystery = -.5, false front = 0. Exposure duration was coded as: 100 msec. = -1½ , 500 msec. = -½ , 2 sec. = ½ , 10 sec. = 1½.

Interpretation of the results is straightforward. In all tables, estimates that are bolded (italicized) indicate 5% (10%) "significance" levels: the 95% (90%) posterior credible interval of the parameter estimate does not contain zero. In addition, we summarize the results in graphs with 5-95% credible intervals. Credible intervals that do not overlap in the graphs are significantly different from each other at a 5% significance level (one-sided).

Results

Product Comprehension. Ad typicality, exposure duration and their interaction influence the accuracy and latency of identifying the advertised product. The results, summarized in tables 2 and 3 and figure 1, support our predictions.

After an exposure of only 100 milliseconds, accurately knowing the advertised product is already extremely high for typical ads (99%), and the short response latency (1.30 seconds) reflects strong feelings of knowing. In contrast, accuracy is significantly lower for mystery ads (27%), and the much longer response latency (5.13 seconds) reflects the high uncertainty, or weak feeling of knowing. Accuracy is lowest for false front ads (1%), but the short response latencies (1.88 seconds) reflect strong feelings of knowing. Participants identified the intended false front category in 89% of the cases. This supports that objective and subjective knowledge are calibrated for typical (accurate and fast) and mystery ads (inaccurate and slow) but miscalibrated for false front ads (inaccurate but fast).

Additional evidence about people's feeling of knowing comes from the distribution of their product category responses. If people are indeed certain about the advertised product, their responses to a specific ad should be concentrated in a single product category (which is accurate for typical and inaccurate for false front ads). If they are uncertain, their responses should be distributed more across all

Table 2. *Descriptive Results*

	Study 1											Study 2			
	Accuracy			Latency			Ad attitude					Ad attitude			
	Typical	Mystery	False front	Typical	Mystery	False front	Typical	Mystery	False front	N_{id}		Typical	Mystery	False front	N_{id}
100 msec.	.99 (.11)	.27 (.45)	.01 (.11)	1.30 (.60)	5.13 (3.34)	1.88 (1.84)	3.56 (.97)	2.60 (.96)	3.32 (1.08)	21	100 msec.	5.05 (1.21)	3.86 (1.47)	4.40 (1.28)	21
500 msec.	.99 (.11)	.29 (.45)	.14 (.35)	1.55 (2.89)	4.89 (3.22)	1.82 (1.85)	3.54 (.95)	2.56 (1.07)	3.04 (1.02)	21	2 seconds	4.82 (1.24)	4.20 (1.58)	4.06 (1.50)	18
2 seconds	1.00 (.00)	.98 (.14)	.78 (.42)	1.28 (.67)	2.13 (2.30)	2.30 (2.29)	3.32 (1.07)	2.76 (1.19)	2.65 (1.12)	24	5 seconds	4.76 (1.30)	4.35 (1.57)	3.94 (1.49)	20
10 seconds	1.00 (.00)	.96 (.21)	.98 (.15)	1.28 (.64)	1.83 (1.68)	1.58 (1.19)	3.30 (1.00)	2.92 (1.27)	2.76 (1.14)	23	30 seconds	4.84 (1.43)	4.40 (1.58)	3.80 (1.61)	19

	Study 3																		
	Accuracy (Product)			Certainty (Product)			Certainty (Brand)			Ad attitude			Brand attitude			N_{id}			
	Typical	Mystery	False front	Typical	Mystery	False front	Typical	Mystery	False front	Typical	Mystery	False front	Typical	Mystery	False front				
100 msec.	.97 (.16)	.17 (.38)	.04 (.19)	6.45 (1.09)	2.30 (1.54)	5.40 (1.56)	3.83 (2.18)	1.70 (1.12)	2.41 (1.64)	4.63 (1.03)	3.51 (1.15)	4.40 (.89)	4.24 (.69)	3.76 (.65)	4.02 (.36)	37			
500 msec.	.96 (.20)	.73 (.45)	.55 (.50)	6.35 (1.36)	4.62 (2.20)	4.99 (1.77)	5.34 (2.18)	3.98 (2.53)	4.31 (2.51)	4.33 (1.14)	3.97 (1.10)	3.92 (1.36)	4.14 (.73)	3.97 (.67)	3.90 (.78)	37			
2 seconds	1.00 (.00)	.95 (.21)	.89 (.32)	6.90 (.55)	6.57 (1.13)	6.25 (1.54)	6.62 (.98)	6.42 (1.41)	6.17 (1.70)	4.53 (1.27)	4.54 (1.34)	3.91 (1.52)	4.10 (1.00)	4.16 (1.04)	3.78 (1.14)	37			
10 seconds	1.00 (.00)	.99 (.10)	.97 (.17)	6.91 (.29)	6.69 (.84)	6.47 (1.14)	6.52 (1.03)	6.50 (1.07)	6.44 (1.25)	4.59 (1.23)	4.60 (1.49)	3.93 (1.63)	4.25 (1.00)	4.19 (1.16)	3.78 (1.06)	39			

Note – Means with standard deviations between parentheses; N_{id} = number of participants per exposure duration condition.

possible product categories (mystery ads). To test this idea, we computed the Herfindahl concentration index (sum of squared response proportions), which ranges here between 1 if all responses fall in a single category (maximum certainty) and .17 if responses are equally distributed across the 6 categories (maximum uncertainty). The Herfindahl index confirms that certainty was much higher for typical (M = .98, SD = .05) and false front ads (M = .82, SD = .16, p < .10) than for mystery ads (M = .32, SD = .09; ps < .001) after a 100-msec. exposure.

Table 3. *Effects of Ad Typicality and Exposure Duration: Study 1*

	Product comprehension				Ad attitude	
	Accuracy		Latency			
Predictors	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*
Constant	**.879**	**.274**	**.536**	**.049**	**1.664**	**.105**
X_1: Typical, Mystery *vs.* False front	**2.605**	**.421**	**.136**	**.045**	**.142**	**.084**
X_2: Typical *vs.* Mystery	**3.321**	**.739**	**-.727**	**.046**	**.808**	**.135**
W: Exposure duration	**1.353**	**.222**	**-.138**	**.032**	-.077	.050
X_1W	**-.819**	**.349**	**-.213**	**.040**	**.252**	**.074**
X_2W	-.405	.584	**.392**	**.041**	**-.263**	**.119**
C_1: Beverages *vs.* Base	**.965**	**.205**	**-.122**	**.053**	-.120	.105
C_2: Fragrances *vs.* Base	**1.078**	**.216**	-.015	.056	-.168	.106
C_3: Tooth care *vs.* Base	**2.771**	**.545**	**-.174**	**.055**	-.116	.109
C_4: Cell phones *vs.* Base	NA	NA	-.092	.093	-.077	.172
C_5: Hair care *vs.* Base	NA	NA	**.188**	**.087**	-.214	.168
Heterogeneity SD						
Constant	.590	.122	.288	.028	.388	.054
X_1	.369	.244	.212	.058	.348	.128
X_2	.916	.530	.168	.059	.970	.132
Residual	NA	NA	.540	.014	NA	NA

Note – Here and in other tables, accuracy: 1 = accurate, 0 = inaccurate; latency in log-seconds, and NA is not applicable. Parameter estimates are means. Bolded (italicized) parameter estimates indicate that the estimate is significant at .95 (.90). Heterogeneity *SD* is the standard deviation of the distribution of the particular parameter estimate across individuals. Heterogeneity *SD*s for dummies of identified product categories (C_1 to C_5) not reported to save space. Correlation between individual-specific constants of accuracy and latency = -.359, *SD* = .152. In the accuracy model, base product category is the average of food, hair care and cell phones (inaccurate by definition). In the latency and attitude models, the base product category is food.

Figure 1 shows that with increasing exposure duration, accuracy remains high for typical ads and increases monotonically for mystery and false front ads. The feeling of knowing what is advertised in mystery ads rapidly improves as reflected in

sharply reduced response latencies, from 5.13 to 1.83 seconds, when exposure durations increase. After an exposure of ten seconds, accuracy and feeling of knowing are at the same very high levels for all three ad-types. Subjective and objective knowledge are then completely calibrated.

Attitudes. Attitudes are significantly influenced by typicality, and by the predicted typicality x exposure duration interaction (table 3). After an exposure of 100 msec., attitudes are significantly more positive for typical (M = 3.56) and false front ads (M = 3.32) than for mystery ads (M = 2.60). When exposure duration increases attitudes remain basically the same for typical ads (slope = -.125, SD = .080). As predicted, attitudes improve for mystery ads (slope = .138, SD = .082, $p < 0.10$), and deteriorate significantly for false front ads (slope = -.245, SD = .072). As a result, after long exposures of 10 seconds, mystery ads are evaluated equally positively (M = 2.92) as typical ads (M = 3.30), whereas false front ads are now evaluated less positively than typical ads (M = 2.76). Figure 1 shows this.

Figure 1. *Comprehension and Attitude Formation: Study 1*

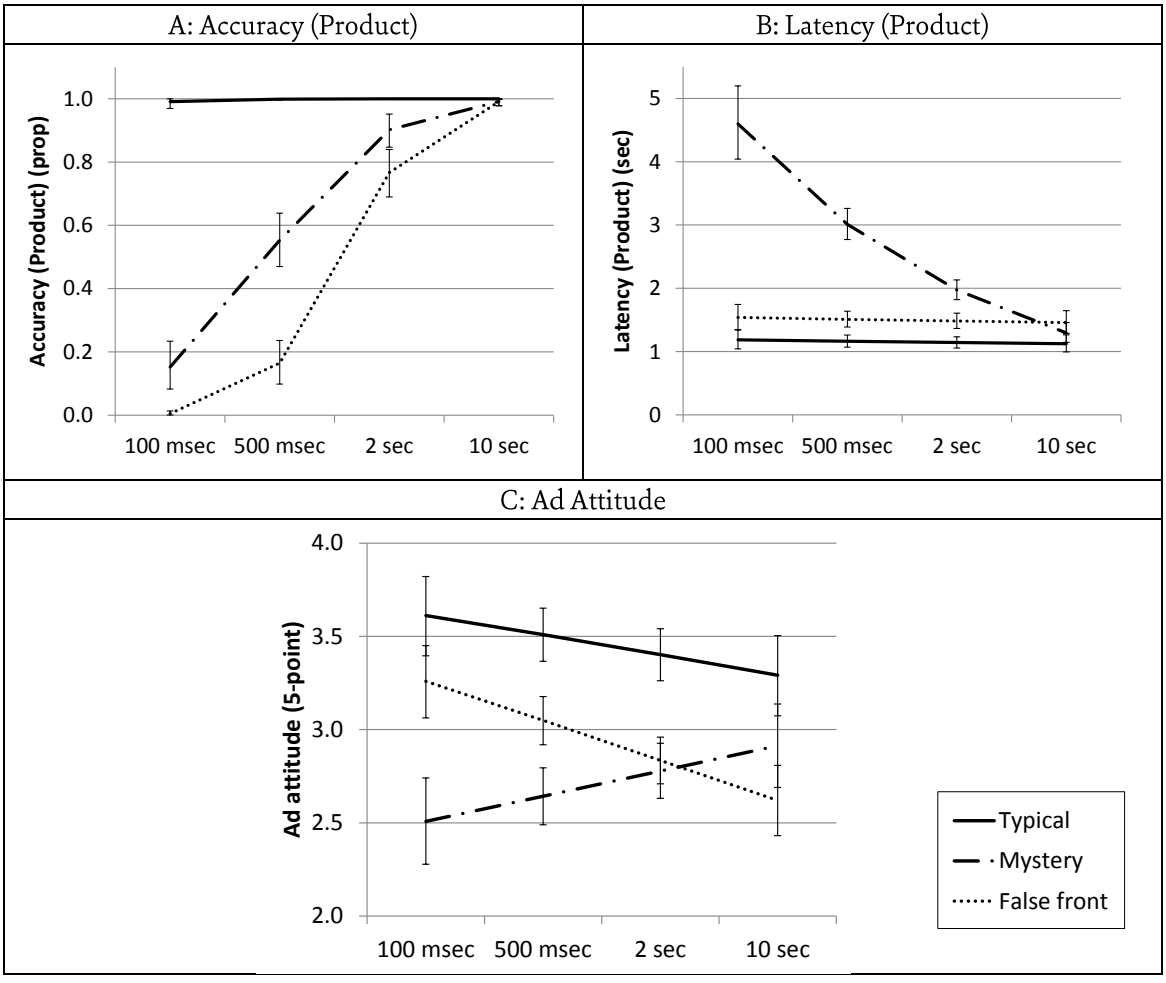
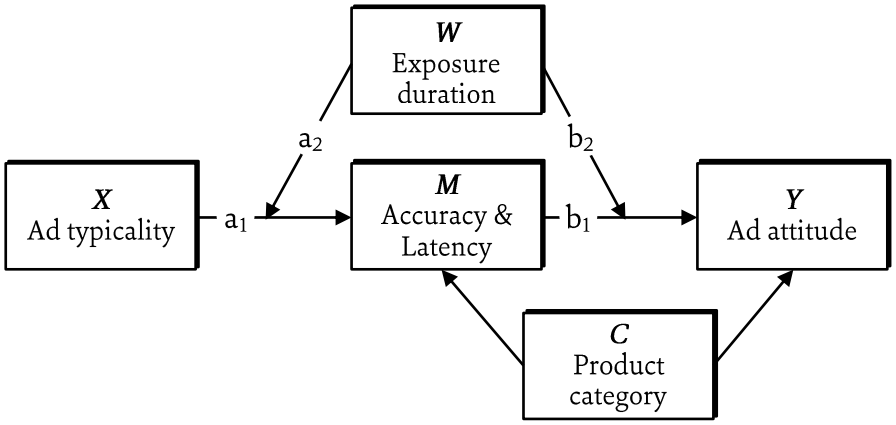


Table 4. *Feeling of Knowing Effects Depend on Exposure Duration*



Moderated mediation: (a_1 x b_2 + a_2 x b_1)	Typical *vs.* Mystery		False front *vs.* Mystery		Typical *vs.* False front	
	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*
Accuracy	.384	.583	.107	.178	.277	.679
Latency	**-.237**	**.058**	**-.207**	**.048**	-.030	.023

Mediation for each exposure condition (W):	Typical *vs.* Mystery		False front *vs.* Mystery	
	Estimate	*SD*	Estimate	*SD*
100 msec.	**.724**	**.169**	**.612**	**.146**
500 msec.	**.367**	**.077**	**.279**	**.061**
2 seconds	**.130**	**.043**	**.072**	**.026**
10 seconds	.013	.020	-.010	.018

Note – Moderated mediation and mediation effects are estimated while controlling for all other effects as per appendix B. Bolded (italicized) parameter estimates indicate that the estimate is significant at .95 (.90). Gray shading indicates the predictions significant moderated mediation effects.

Feeling of Knowing: Moderated Mediation. We reasoned that the effect of typicality on ad attitudes is mediated by the feeling of knowing what is advertised rather than by the accuracy of knowing. And, that the mediating effect is stronger after brief exposures, when little other information about the ad is available, than after longer exposures. To test this, we conducted a moderated mediation analysis with feeling of knowing (M_1) and accuracy of knowing (M_2) as simultaneous mediators and exposure duration as moderator (W), while controlling for the product category that participants identified as being advertised (C). Appendix B describes the model. We expect the moderated mediation effect to hold for the contrast of typical with mystery ads (respectively high and low feeling of knowing), and for the contrast of false front with mystery ads (respectively high and low feeling of knowing), but not

for the contrast of typical with false front ads (both a high feeling of knowing). Evidence for the predictions is strong, as table 4 shows.

We observe in table 4 significant moderated mediation effects through latency for the comparison of typical with mystery ads (indirect effect = -.237, *SD* = .058) and for the comparison of false front with mystery ads (indirect effect = -.207, *SD* = .048), but not for the comparison of typical with false front ads (indirect effect = -.030, *SD* = .023). In addition, there was no significant moderated mediation effect for accuracy in any of the comparisons, as predicted. Also, the size of the mediation effect systematically drops from shorter to longer exposure durations (bottom part of table 4). That is, latency mediates the attitude effect of typical versus mystery ads strongly and significantly at 100 msec. (indirect effect = .724, *SD* = .169), less at 500 msec. (indirect effect = .367, *SD* = .077), even less at 2 seconds (indirect effect = .130, *SD* = .043), to become insignificant after an exposure of 10 seconds (indirect effect = .013, *SD* = .020). Latency also mediates the attitude effect of false front versus mystery ads strongly at 100 msec. (indirect effect = .612, *SD* = .146), less at 500 msec. (indirect effect = .279, *SD* = .061), less at 2 seconds (indirect effect = .072, *SD* = .026), and not significantly anymore at 10 seconds (indirect effect = -.010, *SD* = .018).

This shows that the feeling of knowing which product is advertised, as reflected in shorter response latencies, positively affects ad attitudes especially during shorter exposure durations. It is the feeling rather than the accuracy of knowing that mediates the effect of ad typicality on ad attitudes. Therefore, typical and false front ads are immediately liked more than mystery ads. The effect is independent of the effects of attitudes towards the advertised category. During longer exposure durations, attitudes towards mystery ads improve, and attitudes towards false front ads decline, and the mediating influence of the feeling of knowing becomes smaller. Even after exposures that last for 10 seconds, attitudes towards typical ads are still as positive as those towards mystery ads, but false front ads lag behind.

Study 2

Study 2 aims to generalize the findings of study 1 and to rule out an alternative explanation. Study 1 used 12 ads, four for each ad type. To further establish generality of the findings, we developed a new and larger set of 24 ads for study 2, tested with a new sample of participants, using an attitude scale with more response categories. Furthermore, we used different long exposure durations in this study, namely 5 seconds and 30 seconds.

Five seconds is about the average self-controlled exposure duration to the ads for study 2 under free viewing conditions. We let 48 undergraduate students freely view the 24 ads from study 2 (see "Method" for details) and 24 distracter ads from the same product categories to mimic high clutter situations. The instruction for participants was to view the ads as long or short as they wanted, "as when being at home or in a waiting room". Ad typicality effects on attention were significant (typical, mystery *vs.* false front = -.161, *SD* = .030; typical *vs.* mystery = -.213, *SD* = .033). As predicted and in line with Pieters, Warlop, and Wedel (2002), mystery (*M* = 5.53 sec., *SD* = 3.41) and false front ads (*M* = 5.73 sec., *SD* = 3.32) retained attention longer than typical ads did (*M* = 4.45 sec., *SD* = 2.68), in fact more than a full second.

Ten seconds was the longest exposure duration in study 1. At this duration, atypical ads performed as good as but not better than typical ads. Perhaps, atypical ads are liked better than typical ads at durations much longer than 10 seconds, which are not uncommon in ad research (e.g., Heckler and Childers 1992) but rare in practice. To test this, study 2 included an extremely long duration of 30 seconds.

Finally, participants in study 1 were first asked to indicate the advertised product and then to evaluate the ad. This might have led to demand and measurement effects (Morwitz and Fitzsimons 2004) that may artificially strengthen the linkage between the feeling of knowing and attitude towards the ad, and thus amplify differences in attitudes between the three ad types. To rule out this possibility, participants in study 2 evaluated each ad without the intervening task.

Method

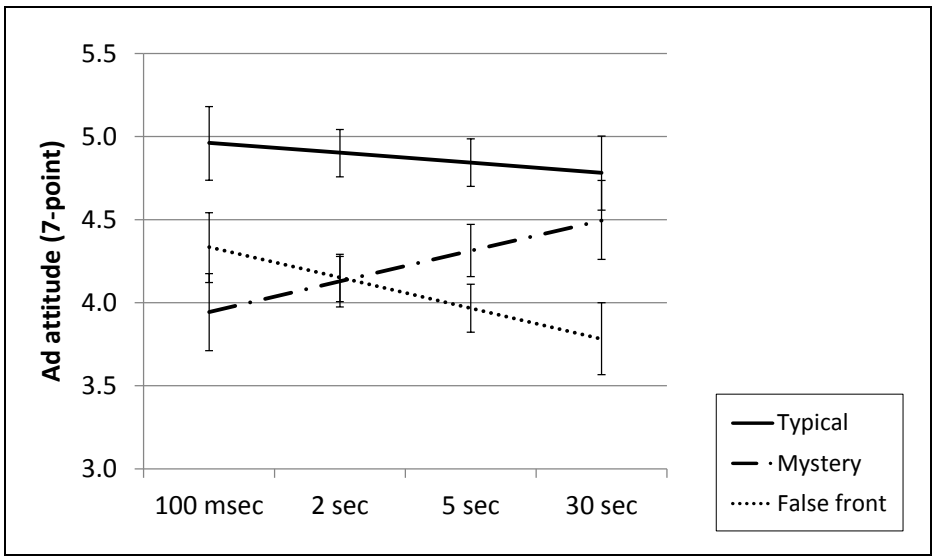
Participants and Design. Seventy-eight undergraduate students (M_{age} = 21.58, *SD* = 2.33, 32 females) were randomly assigned to a condition of a 4 x 3 mixed design, with exposure duration (100 msec., 2 seconds, 5 seconds, and 30 seconds) as between-subjects factor, and ad typicality (typical, mystery, and false front) as within-subjects factor.

Stimuli. Twenty-four new target ads were developed: two ads for each of the same four product categories as in study 1 for each of the three ad types (ads are in appendix A). Ads were pretested using the same items as in study 1 (table A4 in appendix A). Typical ads looked more like other ads for the same product category (*M* = 4.23, $F(1, 21) = 55.01$, $p < .001$) and were easier to identify (*M* = 4.84, $F(1, 21) = 97.68$, $p < .001$) than mystery (*M* = 2.16 and 3.02) and false front ads (*M* = 2.19 and 2.64) and these did not differ from each other (*F*s < 2.7, *p*s > .12). Mystery ads were more original (*M* = 3.97) than false front ads (*M* = 3.26, $F(1 , 21) = 6.11$, $p < .05$), and both were more original than typical ads (*M* = 2.34, $F(1, 21) = 25.91$, $p < .001$).

Typical ads were easier to comprehend (M = 1.57; $F(1, 21)$ = 12.74, p < .01) and judged to require less time (M = 1.56; $F(1, 21)$ = 16.03, p < .01) than mystery ads (M = 2.32 and M = 2.54) and false front ads (M = 2.30 and M = 2.38). The latter two did not differ from each other (Fs < 1). To verify that mystery and false front ads differ in their initial feeling of what is advertised, we added the item "At first glance, this advertisement appears to be for another product," with responses (1) *certainly not*, to (5) *certainly so*. False front ads scored highest (M = 3.94) followed by mystery ads (M = 3.15; $F(1, 21)$ = 10.31, p < .01) and typical ads (M = 1.25; $F(1, 21)$ = 119.40, p < .001). There were no other differences between ad types (brand familiarity, visual appeal, picture-text relevance, and complexity; Fs < 1).

Procedure and Measures. Data collection was the same as in study 1, except that participants now evaluated each ad immediately after exposure to it. Ad attitude was measured on a 7-point scale from (1) *negative* to (7) *positive*, to allow more variation than the 5-point scale in study 1. Each participant saw all ads and was randomly assigned to one of six random sequences of the ads to control for order effects.

Figure 2. *Attitude Formation: Study 2*



Results

The results are very similar to those in study 1. As predicted, ad attitudes are again significantly influenced by ad typicality (X_1: typical, mystery *vs.* false front = .368, SD = .056; X_2: typical *vs.* mystery = .497, SD = .080) and by the predicted typicality x exposure duration interaction (X_1W = .181, SD = .046, X_2W = -.184, SD = .072), and not by the main effect of exposure duration (W = -.016, SD = .041). Raw data summaries are in table 2, and figure 2 summarizes the results.

After an exposure of 100 msec., attitudes are significantly more positive for typical (M = 5.05) than for mystery ads (M = 3.86). Interestingly, in this study, attitudes for false front ads (M = 4.40) are already less positive than for typical ads after 100 msec., as shown in figure 2. This suggests that even after such very brief exposures, participants may already have felt that "something does not fit" in the false front ads and have lowered feelings of knowing. In addition, they may have been less certain about the specific brand that is advertised in false front ads (study 3 returns to this issue).

After longer exposure durations, attitudes towards typical ads in this study do not significantly change (slope = -.047, SD = .057), but attitudes towards mystery ads improve strongly (slope = .137, SD = .057). After long exposure durations of 30 seconds, typical (M = 4.84) and mystery ads (M = 4.40) are liked equally well. In contrast, attitudes towards false front ads become more negative at longer exposures (slope = -.136, SD = .051), and after 5 and 30 second exposures these ads are liked the least, as predicted.

These findings provide additional evidence that the influence of ad typicality on ad attitude critically depends on exposure duration. Typical ads are positively evaluated from the earliest exposure duration onwards, to retain their high liking over extended exposure durations. Mystery ads are initially liked least and require extended exposure durations to gain liking. False front ads are different. Although they were not evaluated as positively as typical ads were after brief exposures in this study, attitudes towards them again dropped, and they were eventually liked least. Finding a similar pattern of results with a different ad set, participant sample, response scale, and without the intervening comprehension task in this study validates the results of study 1.

Study 3

Study 3 makes four extensions. First, it provides more direct evidence that the subjective feeling of knowing affects ad attitudes. Study 1 used response latency as an indirect measure of the feeling of knowing (Koriat 2008; Koriat and Ackerman 2009). Study 3 employs a direct measure (Koriat 1995). Second, it provides more insight into the effects of early comprehension on attitudes, by operationalizing it in terms of the feeling of knowing not only the product but also the brand. Third, it examines the influence of ad typicality on measures of both ad and brand attitudes. Generally, we predict that ad typicality influences brand attitudes indirectly through its effect on ad

attitudes (Brown and Stayman 1992; MacKenzie, Lutz and Belch 1986). However, the impact of ad attitude on brand attitude should be stronger when certainty of knowing the advertised brand is high. Evidence for this moderating effect of brand certainty would show that a brief glance at a mystery ad, which evokes a relatively negative ad attitude due to the feeling of *not* knowing, need not be detrimental to the advertised brand. It will not have positive consequences for brand attitudes either, so typical ads are still expected to outperform them after brief exposures. Finally, study 3 aims to rule out alternative explanations for the attitude effects of ad typicality, by holding all product and brand characteristics in the ads constant.

Method

Participants and Design. One-hundred and fifty (M_{age} = 21.28, *SD* = 4.11, 82 females) paid undergraduate students were randomly assigned to a condition of a 4 x 3 mixed design, with exposure duration (100 msec., 500 msec., 2 seconds, and 10 seconds) as between-subjects factor, and ad typicality (typical, mystery, and false front) as within-subjects factor. Each participant saw 18 ads: 9 new target ads (3 for each ad type) and 9 non-target ads to increase clutter. Ads were for cars, beverages, food, hair care, skin care, and cell phones.

Stimulus Development. In the ad sets for studies 1 (12 ads) and 2 (24 ads), each advertised brand was associated only with a single ad type. Pretesting established that ads for the three ad types did not differ in brand familiarity. Because study 3 extends to brand comprehension and brand attitudes, we needed to be sure that ad typicality effects would be independent of possible main or interaction effects of brand characteristics. Therefore, we developed for each brand three versions of each ad, based on a procedure proposed by Janiszewski and Meyvis (2001) in the context of brand logo design.

First, we selected 16 moderately familiar brands from a set of 60 based on a pilot study (*N* = 22). Next, we developed three ad versions (typical, mystery, and false front) for each brand, resulting in 48 ads in total. We made the three versions by replacing the pictorial element in each ad while keeping everything else constant (headline, brand name, size and position, lay-out). In all cases, we ensured that the pictorials were relevant for the advertised product or message. For example, an ad for a shampoo brand, with the headline "The Energy Boost For Your Hair" displayed either a woman with long, shiny hair (typical), or a rock band performing on stage, with the singer throwing back her long hair (mystery), or a can of energy drink (false front). Then, based on a pretest similar to those for study 1 and 2, we selected the nine brands for which the three ad types differed most in typicality, creativity and

comprehensibility (table A4 in appendix A provides details). By design, ad types only differed in product category typicality and not in brand typicality and familiarity. Separate pretests, with the same measures as before, confirmed that ad types also did not differ in visual appeal, picture-text relevance, and complexity (*F*s < 1.7, *p*s > .2).

Then, we developed three sets of ads each containing nine target ads: three typical, three mystery, and three false front ads. The three sets were constructed such that each brand appeared only once in one of the three ad types in a particular set. The first set, for instance, had a typical car ad (for Kia) and a mystery hair care ad (for Herbal Essences), whereas the second set had a false front car ad (for Kia) and a typical hair care ad (for Herbal Essences), and so forth. Ad order was randomized for each set, with the restriction that no more than two ads of the same typicality or same product category appeared consecutively. To further control for order effects, two sequences were constructed (first-to-last and last-to-first) for each of the three sets of ads. To simulate clutter, each set also contained nine non-target ads, which always appeared in the same position. Participants were randomly assigned to one of the six sets (3 versions x 2 orders).

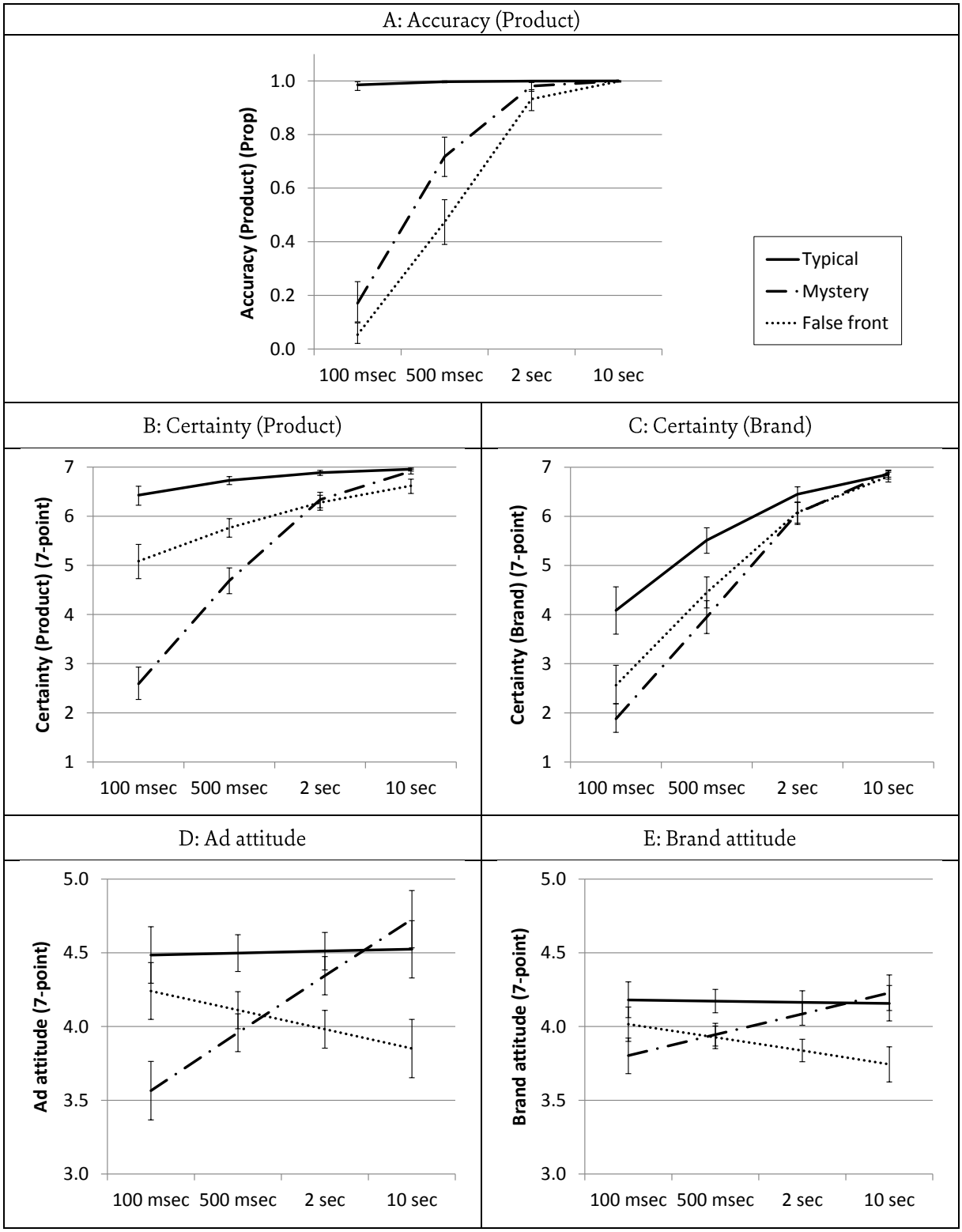
Procedure and Measures. The general set-up was as before but with extra measures. First, participants indicated the advertised product from the names presented on the screen (location and order of names were varied between-subjects). Then, they indicated the certainty of knowing the advertised product ("I am … about this") on a response scale from (1) *absolutely not certain* to (7) *absolutely certain*, and brand ("I know what brand is advertised in this ad") on a scale from (1) *certainly not* to (7) *certainly so*, as a direct measure of feeling of knowing (Koriat 1995). Then, ad attitude was measured ("To me, this ad is …") on a scale from (1) *negative* to (7) *positive*. Finally, brand attitude was assessed ("Due to this ad, my evaluation of the brand has …") on a scale anchored by (1) *become more negative* and (7) *become more positive*, with (4) *not changed* as midpoint.

Results

Product and Brand Comprehension. Table 5 and figure 3 summarize the findings. Ad typicality, exposure duration, and the typicality x exposure duration interaction influence the accuracy and feeling (certainty) of knowing the product. The effects of accuracy and certainty replicate those on accuracy and latency in study 1. That is, for typical ads accuracy (97%) and certainty of knowing (*M* = 6.45) the advertised product are both very high. In contrast, accuracy (17%) and certainty of knowing (*M* = 2.30) are much lower for mystery ads, whereas accuracy is lowest (4%) for false front ads, but certainty is relatively high (*M* = 5.40), as predicted. The false

front category in this latter type of ads is indeed (inaccurately) identified in 90% of the cases.

Figure 3. *Comprehension and Attitude Formation: Study 3*



The Herfindahl index reveals that, as expected, the distribution of responses is most concentrated for typical ads (M = .95, SD = .07), followed by false front ads (M = .82, SD = .09; p < .01), and least so for mystery ads (M = .35, SD = .09; ps < .001). This pattern is consistent with participants' feelings of knowing. Instantly upon exposure the feeling of knowing is calibrated for typical and mystery ads. Yet, it is miscalibrated for false front ads, for which people are overconfident. With longer exposures, the accuracy and feeling of knowing converge to high levels for all ad types (see figure 3).

Certainty of knowing the brand is also significantly influenced by typicality, exposure duration, and the typicality x exposure duration interaction. After brief, 100-msec. exposures, the feeling of knowing the brand in typical ads is highest among the three ad types (M = 3.83), but lower than the feeling of knowing the product (see above, M = 6.45). The feeling of knowing the brand is significantly lower for both types of atypical ads than for typical ads. Participants are more certain about knowing the brand in false front ads (M = 2.41) than in mystery ads (M = 1.70). Certainty of knowing the brand rapidly rises to the same, high levels for typical and atypical ads after exposures of 2 and 10 seconds.

Attitudes. Typicality and the typicality x exposure duration interaction influence ad and brand attitudes significantly. The pattern of results is consistent with the findings of study 1 and 2. That is, after an exposure of 100 msec., attitudes towards typical (M = 4.63) and false front ads (M = 4.40) are more positive than those towards mystery ads (M = 3.51). When exposure duration increases, attitudes towards typical ads do not change (slope = .013, SD = .061), whereas those towards mystery ads rise sharply (slope = .374, SD = .062), and those towards false front ads drop (-.116, SD = .061, p < .10). Thus, after a 10-second exposure, attitudes towards typical (M = 4.59) and mystery ads (M = 4.60) are equally positive and more so than those towards false front ads (M = 3.93). Results for brand attitudes parallel those of ad attitudes, although the differences are smaller, particularly at brief exposures as expected (table 2 and figure 3). Brand attitude is highest and remains stable for typical ads (slope = -.010, SD = .060), improves for mystery ads (slope = .218, SD = .061) and deteriorates for false front ads (slope = -.142, SD = .059).

Feeling of Knowing: Moderated Mediation. The feelings of knowing the advertised product and brand both mediate the effect that ad typicality has on ad attitudes, as predicted. Table 6 summarizes the findings. The mediation effect is again stronger for shorter than for longer exposures. In contrast, the moderated mediation effect for the actual accuracy of knowing is again not significant. The effects are

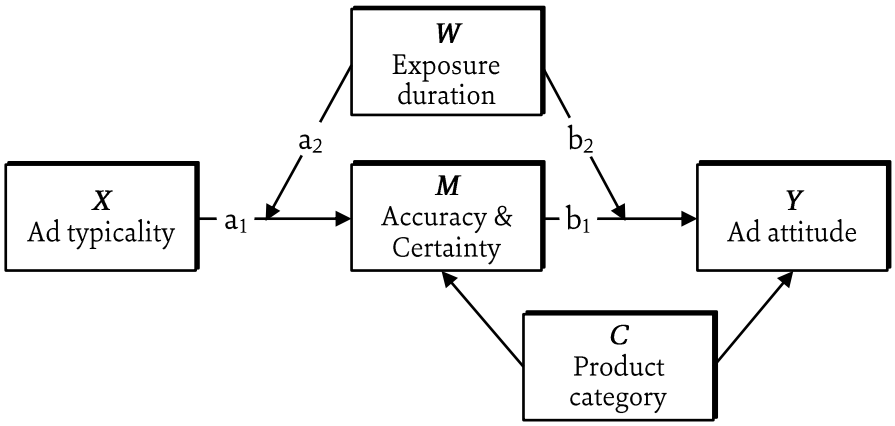
Table 5. *Effects of Ad Typicality and Exposure Duration: Study 3*

	Comprehension						Attitude			
	Accuracy		Certainty (Product)		Certainty (Brand)		Ad		Brand	
Predictors	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*
Constant	**2.240**	**.267**	**3.156**	**.157**	**2.027**	**.133**	**2.721**	**.119**	**3.118**	**.164**
X_1: Typical, Mystery *vs.* False front	**1.686**	**.279**	**.480**	**.087**	**.245**	**.083**	**.306**	**.065**	**.364**	**.071**
X_2: Typical *vs.* Mystery	**2.114**	**.439**	**1.512**	**.130**	**.631**	**.106**	**.348**	**.078**	**.244**	**.086**
W: Exposure duration	**1.411**	**.171**	**.762**	**.073**	**1.098**	**.088**	*.090*	*.047*	.022	.042
X_1W	*-.441*	*.233*	**.368**	**.076**	-.010	.074	**.310**	**.058**	**.246**	**.062**
X_2W	**-1.040**	**.333**	**-.760**	**.107**	**-.483**	**.095**	**-.361**	**.069**	**-.229**	**.077**
C_1: Cars *vs.* Food	-.289	.219	-.187	.124	**.339**	**.122**	**-.460**	**.089**	**-.458**	**.099**
C_2: Beverages *vs.* Food	**-.692**	**.229**	-.096	.135	.098	.127	-.033	.107	-.054	.119
C_3: Hair care *vs.* Food	**-.509**	**.259**	-.239	.154	-.229	.140	**-.436**	**.107**	**-.397**	**.118**
C_4: Skin care *vs.* Food	**-.632**	**.240**	**-.623**	**.135**	**-.668**	**.137**	**-.587**	**.107**	**-.776**	**.122**
C_5: Cell phones *vs.* Food	**.609**	**.279**	**-.750**	**.138**	**-.366**	**.128**	**-.496**	**.095**	**-.436**	**.104**
Heterogeneity SD										
Constant	.931	.135	.746	.075	.915	.084	.532	.047	.405	.041
X_1	.664	.300	.208	.101	.171	.079	.171	.074	.160	.069
X_2	.650	.384	.463	.203	.406	.185	.323	.141	.399	.160

Note – All variable codings as before. Certainty and attitude on 7-point scales; Bolded (italicized) parameter estimates are significant at .95 (.90). Correlations between individual-specific constants for accuracy and certainty (product) = .827, *SD* = .059; accuracy and certainty (brand) = .817, *SD* = .065; certainty (product) and certainty (brand) = .808, *SD* = .053; ad attitude and brand attitude = .780, *SD* = .054. Heterogeneity *SD*s for dummies of identified product categories (C_1 to C_5) not reported to save space.

independent of product category affect, as this was controlled for through category-dummies.

Table 6. *Feeling of Knowing Effects Depend on Exposure Duration: Study 3*



Moderated Mediation: (a_1 x b_2 + a_2 x b_1)	Typical *vs.* Mystery		False front *vs.* Mystery		Typical *vs.* False front	
	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*
Accuracy	.165	.261	.029	.115	.135	.326
Certainty (Product)	**-.082**	**.040**	**-.077**	**.024**	-.005	.038
Certainty (Brand)	*-.035*	*.018*	**-.020**	**.010**	-.015	.015

Mediation for each exposure condition (W):	Typical *vs.* Mystery		False front *vs.* Mystery	
	Estimate	*SD*	Estimate	*SD*
Certainty (Product):				
100 msec.	**.281**	**.108**	**.148**	**.058**
500 msec.	**.195**	**.057**	**.067**	**.021**
2 seconds	**.113**	**.053**	-.009	.013
10 seconds	.036	.038	-.082	.061
Certainty (Brand):				
100 msec.	*.094*	*.050*	*.030*	*.019*
500 msec.	**.070**	**.023**	*.015*	*.010*
2 seconds	**.035**	**.017**	-.005	.011
10 seconds	- .010	.022	-.030	.025

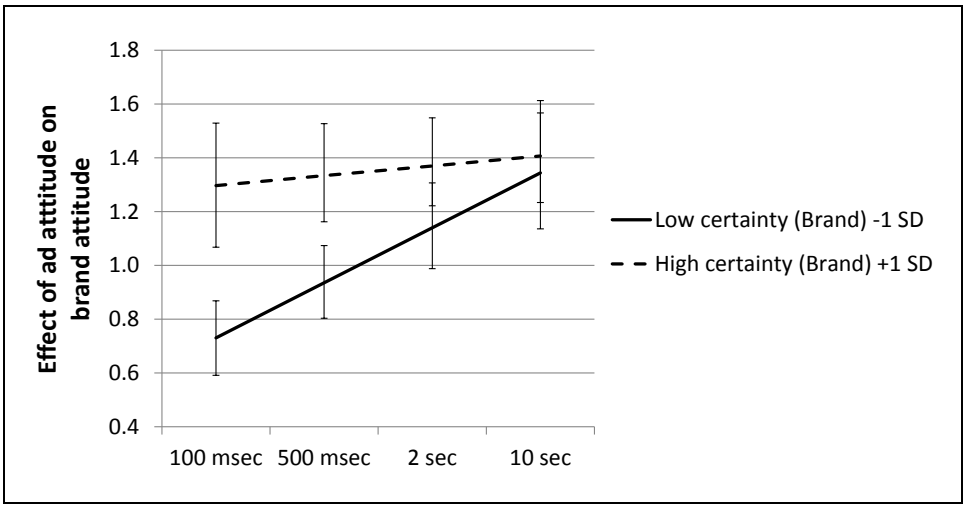
Note – Moderated mediation and mediation effects are estimated while controlling for all other effects as per appendix B. Bolded (italicized) parameter estimates indicate that the parameter is significant at .95 (.90). Gray shading indicates the predicted significant moderated mediation effects.

As predicted, the mediating effect of the feeling of knowing is moderated for the contrast between typical and mystery ads (indirect effect = -.082, *SD* = .040, for

product; indirect effect = -.035, *SD* = .018, for brand), and for that between false front and mystery ads (indirect effect = -.077, *SD* = .024, for product; indirect effect = -.020, *SD* = .010, for brand), as indicated in table 6. The feeling of knowing the product mediates the attitude effect of typical versus mystery ads, most strongly after exposures of 100 msec. (indirect effect = .281, *SD* = .108), less after exposures of 500 msec. (indirect effect = .195, *SD* = .057) and 2 seconds (indirect effect = .113, *SD* = .053), and not significantly anymore after long exposures of 10 seconds (indirect effect = .036, *SD* = .038). It also mediates the attitude effect of false front versus mystery ads strongly at 100 msec. (indirect effect = .148, *SD* = .058), less at 500 msec. (indirect effect = .067, *SD* = .021), and not significantly anymore at 2 seconds (indirect effect = -.009, *SD* = .013) and 10 seconds (indirect effect = -.082, *SD* = .061). The mediating effect of the feeling of knowing the brand is similar, but somewhat smaller.

Taken together, this provides evidence that the feeling of knowing which product and brand are being advertised contributes significantly to favorable ad attitudes, especially at shorter exposures. This immediate feeling of knowing accounts for the more positive attitudes towards typical and false front ads, as compared to mystery ads early on. As exposure duration increases, the effect of feeling of knowing tapers off, as participants' feeling of knowing the advertised product and brand improves and becomes better calibrated.

Figure 4. *Effect of Ad Attitude on Brand Attitude*



Effect of Ad Attitude on Brand Attitude. Brand attitudes are significantly influenced by attitude towards the ad (estimate = .869, *SD* = .115), but the effect is qualified by an interaction between ad attitude, exposure duration, and the certainty of knowing the brand (estimate = -.035, *SD* = .013). Figure 4 shows this. When

exposure duration is brief, the influence of ad attitude on brand attitude depends on the certainty with which the advertised brand is identified. As predicted, ad attitudes have a stronger impact on brand attitudes when consumers are relatively certain about the brand (100 msec.: estimate = .731, *SD* = .087 and estimate = 1.297, *SD* = .140, at one standard deviation below and above the mean of brand certainty, respectively). Since the certainty of knowing what is being advertised directly contributes to positive attitudes after brief exposures, positive ad attitudes (for typical ads) are more likely to transfer to the brand than negative attitudes (for mystery ads). The moderating effect of certainty disappears when exposure duration is longer, and feelings of knowing the brand reach ceiling levels.

General Discussion

It appears ironic that much is known about attitudes formed after very long exposures of up to twenty seconds and more and about attitudes formed after very short, subliminal exposures, but little to nothing about what happens in between these two extremes from the single glance to the couple of seconds that the bulk of ads receive in practice. We aimed to bridge this gap.

Three studies reveal that attitudes for ads that are typical for a specific product category were immediately positive and mostly did not change across exposure durations that lasted from a mere 100 milliseconds up to 10 seconds. Attitudes for atypical ads changed across these exposure durations, but in markedly different ways, depending on their specific kind of atypicality. Mystery ads are not typical for any specific product category. Attitudes for these ads were initially least positive but improved to eventually reach the same level as the attitudes for typical ads. False front ads appear typical for another product category than they actually advertise. Attitudes for these ads were initially mostly as positive as attitudes for typical ads but worsened to eventually be the least positive.

These rapid attitude formation processes are set off by the feeling of knowing the gist of ads in terms of the advertised products and brands. Feelings of knowing are most influential early on during ad exposure when feedback about their accuracy and other information about the ads are limited. One contribution of this research is to identify the importance of product comprehension in attitude formation early on during ad exposure. To avoid overgeneralization, it is important to point out that our focus was not on the more elaborate message comprehension and meaning extraction processes that may become more influential during longer ad exposures. Yet, for

atypical ads, product and message comprehension are likely to go hand in hand, and may both contribute to more positive attitudes after longer exposures. During exposure to these ads, information from successive eye fixations is integrated, which not only reveals what is being advertised (e.g., "this is a toothpaste ad") but also the ad's message (e.g., "for a white smile")[7].

Ad comprehension in terms of the feeling and accuracy of knowing the advertised products and brands appears to have received unduly little attention in advertising theory and research, perhaps because of the implicit assumption that it is easy to attain. However, our results contest that this assumption holds for all ads in all exposure situations. They point out that comprehension of what is being advertising in atypical ads is challenging under common brief exposure durations, with surprising implications for attitude formation. This is particularly important in view of rising levels of clutter in all media and harried exposure-conditions that arise for in-store and outdoor advertising, all of which cause brief exposures to be prevalent.

Relationship to Other Research

The present research has parallels to the person perception and stereotyping literatures (Fiske and Neuberg 1990; Kruglanski and Orehek 2007; Kunda and Spencer 2003; Trope 1986). Several theories in those domains also propose an initial categorization stage in evaluating others, and specific individuating processes to expand, confirm or adapt the original categorization (Fiske and Neuberg 1990; Trope 1986). The present model and findings differ from that literature in several ways. First, in the stereotyping literature, initial categorization is considered to be a shortcut to reduce cognitive overload, but a step that can be avoided (Kunda and Spencer 2003). The present account considers product comprehension to be a necessary step without which message comprehension is hard and ad effectiveness practically impossible. Second, the person perception literature has often assumed that initial categorization attempts are successful and effortless (Fiske and Neuberg 1990; Trope 1986, see the critique of Kruglanski and Orehek 2007), whereas our account allows for the possibility that initial categorization attempts are unsuccessful and effortful – see the case of mystery ads. Third, the person perception literature has focused on the

[7] Mystery ads for unfamiliar brands represent a situation in which message comprehension might even precede product comprehension. In that situation, reading the unfamiliar brand name may not lead to product comprehension. Then, message comprehension ("for a white smile") is likely to be required for comprehension of what is being advertised in terms of the product ("Aha, this ad is for toothpaste") and brand ("Aha, ALMAX is a toothpaste brand"). Yet, since the ad's message cannot be instantly understood, we would make the same prediction that initially negative attitudes improve as a result of ad comprehension after longer exposures.

affective implications of the outcomes of categorization (the activated social or behavioral category), whereas our study emphasizes the affective implications of the process of categorization itself, that is, of the feeling of knowing. Recent work by Kunda and Spencer (2003) on the role of comprehension versus other goals aims to amend the perspective in person perception research. Fourth, the person perception literature has emphasized the subjective categorization of others. In contrast, the present model unravels subjective (feeling) and objective (accuracy) knowledge – via the case of false front ads –, their implications for attitude formation during ad exposure, and identifies determinants of knowledge calibration. This may prove useful in advertising research and perhaps inform the person perception literature as well.

Communication Effects of Ad Typicality

Our model and findings also speak to the creativity literature in advertising. Creative ad development is predicated on the idea that creative ads stand out and are evaluated more positively than non-creative ads. Prior research has indeed found, for instance, that original ads attract and retain more attention and are remembered better (Pieters, Warlop, and Wedel 2002) and that attitudes towards creative print ads (Goldenberg, Mazursky, and Solomon 1999) and television commercials are more positive (Smith et al. 2007). In our studies, atypical ads were judged to be more original (the prime dimension of creativity; Smith et al. 2007) than typical ads were. However, within the range of exposure durations from 100 milliseconds to ten seconds, attitudes towards atypical ads were never more positive than those towards typical ads, which seems to refute prior research.

A likely explanation for the attitude advantage of typical ads seems to be that the atypical ads here were not very creative in an absolute sense, nor were they meant to be. They reflect the garden-variety atypicality that one encounters in everyday magazines, rather than extreme levels of award-winning creativity. The creativity scores of the ads in our studies support this. In study 2, they were 3.97 and 3.26, respectively for mystery and false front ads, which is higher than the 2.34 for typical ads but still close to the middle of the five-point scale.

The finding that typical ads attained consistently positive attitudes suggests unexpected benefits of being "normal" at least for short exposure durations and the ads used in our studies. Follow-up research may examine under which broader conditions and for which ads the typicality advantage holds. The proposed data collection methodology and model may prove useful in tracking the effects in such studies.

Calibration of Comprehension

The present work contributes to a better understanding of knowledge calibration in advertising. In their review, Alba and Hutchinson (2000) noted a lack of consumer studies on knowledge calibration, and Koriat (1995; 2008) has likewise called for more research to understand the determinants of possible dissociations between subjective and objective knowledge. In our study, distinguishing the two kinds of atypicality presented by mystery and false front ads allowed us to separate the attitudinal effects of the feeling from the accuracy of knowing what is being advertised in ads. The feeling and accuracy of knowing were calibrated for all three kinds of ad typicality after longer exposure durations. But, the feeling of knowing was miscalibrated for false front ads early on, because people felt they knew what the ad was for but actually did not. Further, the feeling and accuracy of knowing were calibrated for mystery and typical ads early on, but at different levels: low for mystery ads and high for typical ads.

The focus here was on typicality for the advertised product category, and we investigated its effects on comprehension and attitudes towards ads and brands. Future studies might examine typicality of ads for the advertised brand on these measures. That is, some brands have succeeded in developing brand-typical communication campaigns, such as the frogs-and-lizards campaign of Budweiser, or the gecko campaign of Geico. Although such ads are atypical for the product category of beer or insurances, and initially posed a mystery, they became typical for the brand. An important question is how comprehension and attitudes for such ads evolve during ad exposure. Future work may examine this. This may also extend the current, admittedly broad classification of three kinds of ad typicality. Some ads, for instance, may immediately activate two conflicting product categories or brands, and such "ambiguous ads" may have different effects than mystery and false front ads. Other ads use the front of editorial information, and are thus atypical for advertisements themselves. We believe it is of great interest to study these and other types of ads and their effects on comprehension and attitude formation processes from the very first moment onwards.

Appendix A

Ads in the Studies

Table A1. *Ads in Study 1*

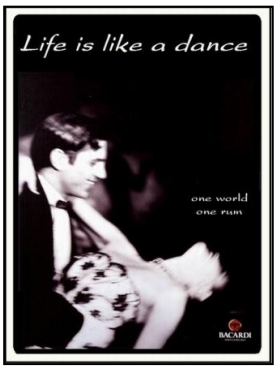
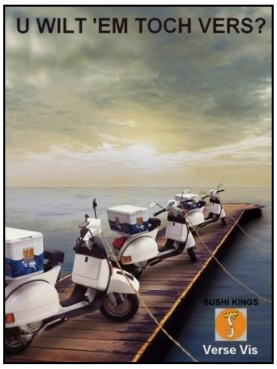
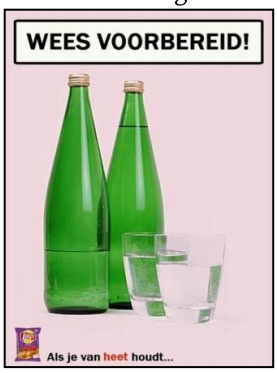
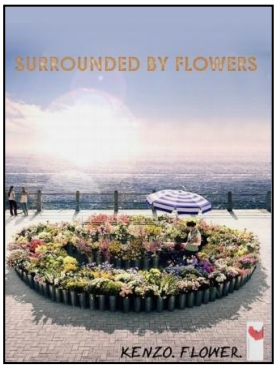
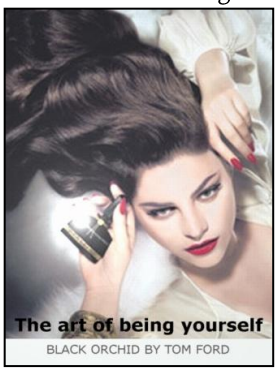
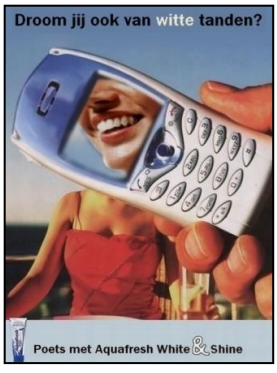
	Typical	Mystery	False front
Beverages			 *False front: fragrances*
Food products			 *False front: beverages*
Fragrances			 *False front: hair care*
Tooth care			 *False front: cell phones*

Table A2. *Ads in Study 2*

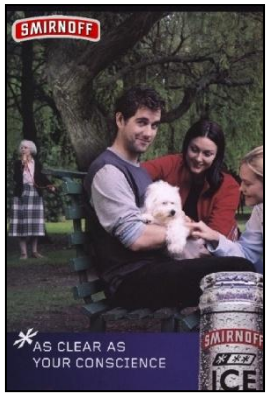
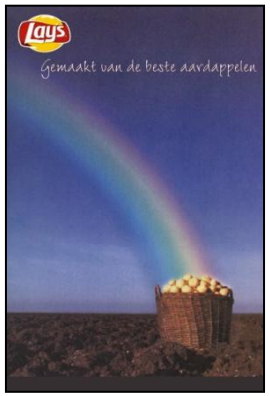
	Typical		Mystery		False front	
Beverages					 *False front: fragrances*	 *False front: tooth care*
Food products					 *False front: cell phones*	 *False front: hair care*

Table A2 *(continued).*

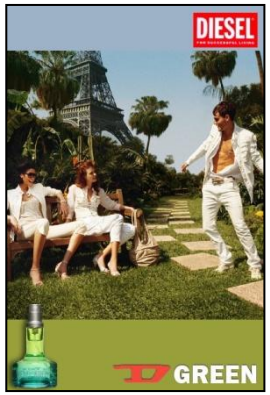
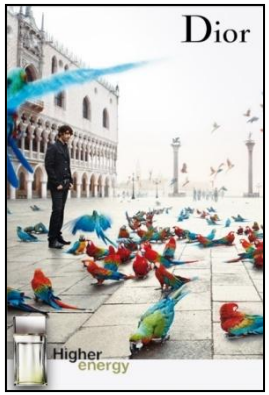
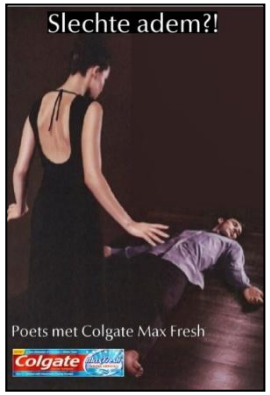
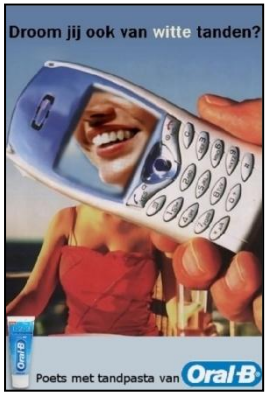
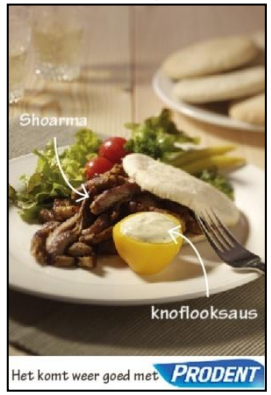
	Typical		Mystery		False front	
Fragrances					 *False front: hair care*	 *False front: beverages*
Tooth care					 *False front: cell phones*	 *False front: food products*

Table A3. *Ads in Study 3*

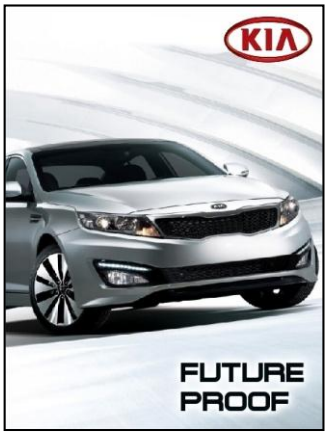
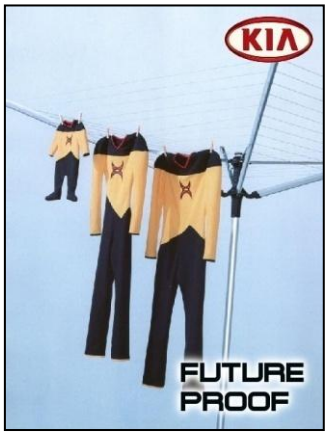
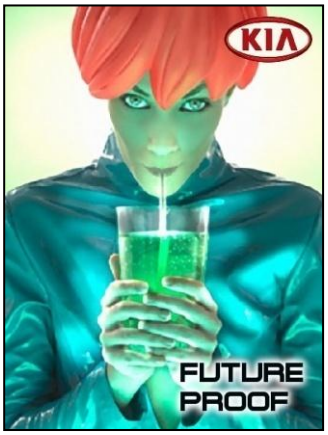
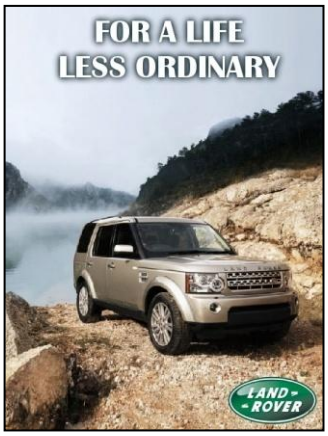
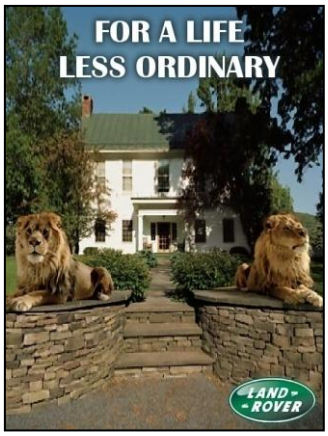
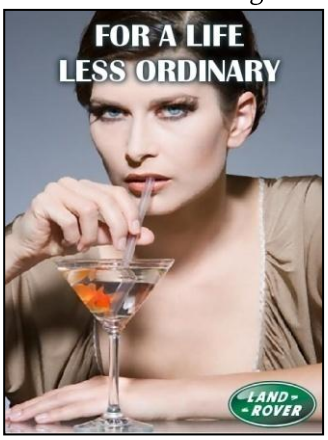
	Typical	Mystery	False front
Cars			
			False front: beverages
Cars			
			False front: beverages
Beverages			
			False front: personal care

Table A3 *(continued).*

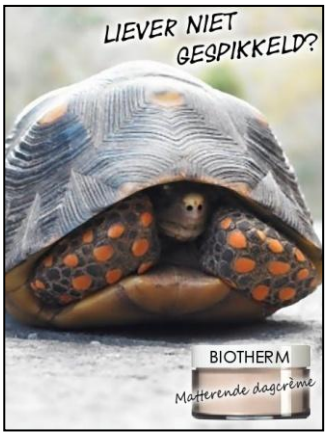
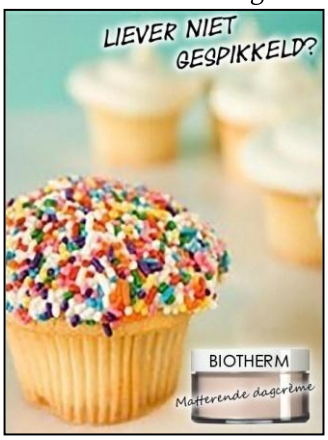
	Typical	Mystery	False front
Personal care (hair care)			 *False front: beverages*
Personal care (skin care)			 *False front: food products*
Food products			 *False front: personal care*

Table A3 *(continued).*

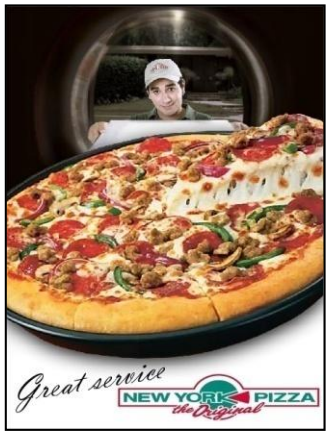
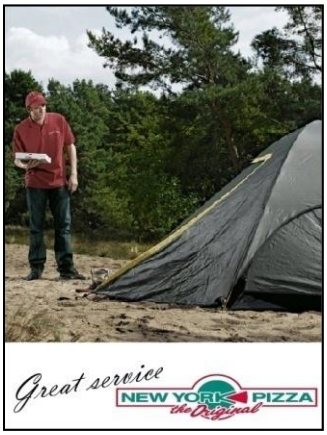
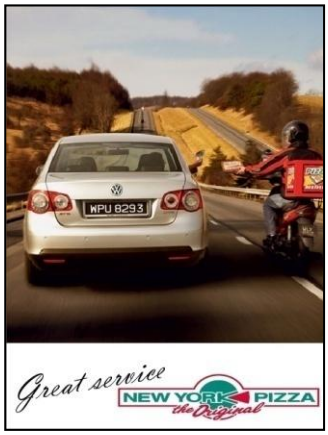
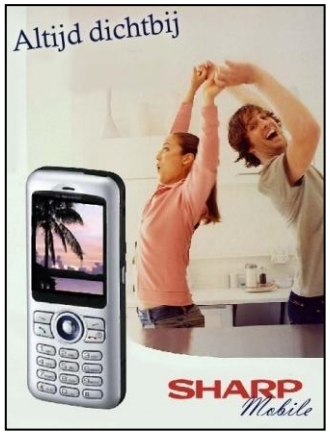
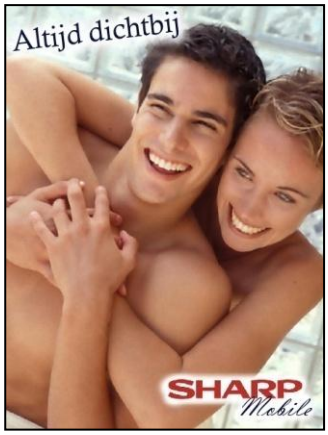
	Typical	Mystery	False front
Food products			
			False front: cars
Cell phones			
			False front: cars
Cell phones			
			False front: personal care

Table A4. *Characteristics of Ads in the Studies*

		Typical		Mystery		False front				
	Study	Mean	(*SD*)	Mean	(*SD*)	Mean	(*SD*)	*F*	*p*	N_{id}
Typicality										
Looks like other ads	S1	4.24[a]	(.20)	2.03[b]	(.43)	2.18[b]	(1.03)	14.27	<.010	45
	S2	4.23[a]	(.25)	2.16[b]	(.59)	2.19[b]	(.91)	27.51	<.001	22
	S3	4.02[a]	(.24)	1.91[b]	(.40)	1.91[b]	(.31)	126.67	<.001	10
Easy to identify	S1	4.53[a]	(.23)	2.29[b]	(.30)	2.19[b]	(.68)	34.43	<.001	45
	S2	4.84[a]	(.19)	3.02[b]	(.46)	2.64[b]	(.65)	50.15	<.001	22
	S3	4.66[a]	(.23)	2.02[b]	(.63)	1.88[b]	(.66)	73.84	<.001	10
Appears to be for another product	S1	-	-	-	-	-	-	-	-	-
	S2	1.25[a]	(.20)	3.15[b]	(.53)	3.94[c]	(.64)	63.08	<.001	22
	S3	1.80[a]	(.28)	3.04[b]	(.35)	3.88[c]	(.38)	84.41	<.001	10
Creativity										
Original	S1	1.77[a]	(.11)	3.88[b]	(.27)	3.68[b]	(.99)	15.16	<.010	45
	S2	2.34[a]	(.41)	3.97[b]	(.49)	3.26[c]	(.77)	16.01	<.001	21
	S3	2.60[a]	(.40)	3.84[b]	(.32)	3.48[b]	(.59)	18.03	<.001	10
Comprehensibility										
Difficult to comprehend	S1	1.76[a]	(.25)	3.22[b]	(.09)	3.08[b]	(.24)	61.78	<.001	45
	S2	1.57[a]	(.34)	2.32[b]	(.66)	2.30[b]	(.38)	6.37	<.010	21
	S3	1.77[a]	(.36)	2.60[b]	(.33)	2.94[b]	(.76)	12.11	<.001	10
Requires time	S1	1.58[a]	(.05)	3.32[b]	(.11)	3.16[b]	(.32)	95.80	<.001	45
	S2	1.56[a]	(.44)	2.54[b]	(.64)	2.38[b]	(.45)	8.21	<.010	21
	S3	1.74[a]	(.38)	2.56[b]	(.34)	2.90[b]	(.73)	11.87	<.001	10
Other										
Brand familiarity	S1	4.25	(.80)	2.65	(1.52)	4.08	(1.42)	1.86	.211	21
	S2	4.70	(.17)	4.68	(.22)	4.70	(.11)	.02	.979	21
	S3	-	-	-	-	-	-	-	-	-
Visual appeal (pictorial)	S1	3.07	(.31)	3.25	(.50)	2.88	(.53)	.65	.547	19
	S2	3.03	(.64)	3.05	(.68)	3.01	(.51)	.01	.993	19
	S3	3.14	(.38)	3.13	(.43)	3.21	(.47)	.11	.897	19
Picture-text relevance	S1	3.55	(.31)	3.70	(.59)	3.18	(.33)	1.57	.260	20
	S2	3.34	(.58)	3.47	(.70)	3.24	(.51)	.28	.759	20
	S3	3.50	(.29)	3.84	(.45)	3.51	(.57)	1.62	.219	20
Complexity	S1	204	(48)	241	(68)	219	(50)	.44	.657	-
	S2	221	(48)	212	(35)	219	(36)	.11	.898	-
	S3	250	(30)	270	(52)	275	(48)	.80	.461	-

Note – Typicality: "This ad looks like other ads for this kind of product", "I instantly know what kind of product is advertised", and "At first glance, this advertisement appears to be for another product", on 5-point scales from (1) *certainly not* to (5) *certainly so*. Creativity: "This ad is …", 5-point, from (1) *not original* to (5) *original*. Comprehensibility: "This ad is … to comprehend", 5-point, from (1) *easy* to (5) *difficult*, and "It takes some time before I comprehend this ad", 5-point, from (1) *certainly not* to (5) *certainly so*. Brand familiarity: 5-point, from (1) *unfamiliar* to (5) *familiar*. Note that brand familiarity is constant by design in study 3. Visual appeal (only ad pictorials are presented, textual and brand elements removed), two 5-point items, from (1) *ugly* to (5) *beautiful*, and from (1) *unattractive* to (5)

attractive (α = .89, .97, and .86 for study 1, 2, and 3, respectively). Picture-text relevance: "In this ad, the picture fits with the text" from (1) *not at all* to (5) *perfect*. Complexity: file-size of the JPEG-compressed ad image. Ad ratings come from various participant samples, ranging between 10 and 45 participants per ad and item (N_{id}). Data are analyzed at the ad-level (N_{ad} = 8, 24, and 27 for study 1, 2, and 3, respectively). Means (row-wise) with different superscripts differ significantly at the 5% level.

Appendix B

Model Description

We describe the latent variable path model estimated in study 3, and how the models for study 1 and 2 are special cases of it. The model generalizes Bayesian multilevel mixed-outcome regression (Wedel and Pieters 2000) to estimate multiple mediation effects (Zhang, Wedel, and Pieters 2009). It contains an ad-level and a person-level component.

Ad-level Model

Because ad attitude ($y_{i,j}^{a}$, where $i = 1, \ldots, N$ are participants and $j = 1, \ldots, J$ are ads) and brand attitude ($y_{i,j}^{b}$) are ordered categorical variables, ordered probit models are specified, where $\pi_{i,j,c}^{k}$ ($k = \{a, b\}$) are the probabilities of the response categories $c = 1, \ldots, C$. They are specified as: $\pi_{i,j,c}^{k} = \Phi(\gamma_{c}^{k} - \eta_{i,j}^{k}) - \Phi(\gamma_{c-1}^{k} - \eta_{i,j}^{k})$. The observed responses reflect an underlying continuous latent variable, which is discretized through C cut points represented by the γ_{c}^{k}-parameters; the following cut points are fixed: $\gamma_{0}^{k} = -\infty, \gamma_{1}^{k} = 0, \gamma_{C}^{k} = \infty$ for identification (Congdon 2005). For ad attitudes ($y_{i,j}^{a}$), the ad-level model for the underlying latent variable is:

$$\eta_{i,j}^{a} = X_{j}'\delta_{i}^{a} + M_{i,j}'\beta_{i}^{a} + C_{i,j}'\lambda_{i}^{a} \tag{1}$$

X_j is a (3 x 1) vector, which contains the intercept ($X_{j,1}$) and two orthogonal typicality contrasts ($X_{j,2}, X_{j,3}$). $M_{i,j}$ is a vector containing the potential mediators. $C_{i,j}$ is a (5 x 1) vector, which contains dummy variables for the product category that participant i indicated in ad j (food is the baseline).

The ad-level model for the latent variable of brand attitudes ($y_{i,j}^{b}$) is:

$$\eta_{i,j}^{b} = X_{j}'\delta_{i}^{b} + M_{i,j}'\beta_{i}^{b} + Y_{i,j}'\psi_{i}^{b} + C_{i,j}'\lambda_{i}^{b} \tag{2}$$

where $Y_{i,j}$ is a (2 x 1) vector, which contains ad attitude ($y_{i,j}^{a}$) and its interaction with brand certainty.

For the mediators ($M_{i,j}$), the ad-level model is:

$$\eta_{i,j}^{k} = X_{j}'\delta_{i}^{k} + C_{i,j}'\lambda_{i}^{k} \tag{3}$$

where k indicates the outcomes ($k = \{c, d\}$: accuracy and latency in study 1, and $k = \{c, e, f\}$: accuracy, and product and brand certainty in study 3). For accuracy (yes-no, following a Bernoulli distribution with success probability $\pi_{i,j}^{c}$), a probit link is used: $\text{probit}(\pi_{i,j}^{c}) = \eta_{i,j}^{c}$. For latency (in seconds, following a log-normal distribution), $\log(y_{i,j}^{d}) = \eta_{i,j}^{d} + \varepsilon_{i,j}$, where $\varepsilon_{i,j} \sim \text{N}(0, \sigma_{y}^{2})$. Because product and brand certainty are ordered categorical variables, an ordered probit specification is used with

probabilities $\pi_{i,j,c}^{k} = \Phi(\gamma_{c}^{k} - \eta_{i,j}^{k}) - \Phi(\gamma_{c-1}^{k} - \eta_{i,j}^{k})$ for $k = \{e, f\}$, for the response categories $c = 1, \ldots, C$, similar to the ones specified above.

The parameters in (1), (2) and (3) δ_{i}^{k}, λ_{i}^{k}, β_{i}^{k}, and ψ_{i}^{b} are individual-specific and account for heterogeneity between individuals in the effects of ad typicality. Dependencies between potential mediators (e.g., accuracy and latency) are accounted for by allowing individual-specific constants to co-vary (e.g., $\rho^{c,d} = \text{cov}(\delta_{i,1}^{c}, \delta_{i,1}^{d})$).

Person-level Model

At the person-level, the means of the distributions of δ_{i}^{k} (for $k = \{a, \ldots, f\}$), β_{i}^{k} (for $k = \{a, b\}$), and ψ_{i}^{b} are parameterized as functions of exposure duration (W):

$$\begin{aligned} \delta_{i}^{k} &\sim \text{N}(\bar{\delta}^{k\prime} W_{i}, \Sigma_{\delta}^{k}), \\ \beta_{i}^{k} &\sim \text{N}(\bar{\beta}^{k\prime} W_{i}, \Sigma_{\beta}^{k}), \text{ and} \\ \psi_{i}^{b} &\sim \text{N}(\bar{\psi}^{\prime} W_{i}, \Sigma_{\psi}), \end{aligned} \tag{4}$$

where W_{i} is a (2 x 1) vector, which contains a constant ($W_{i,1}$) and the exposure duration ($W_{i,2}$). The individual-specific parameters λ_{i}^{k} are assumed to follow a normal distribution across the participant sample $\lambda_{i}^{k} \sim \text{N}(\bar{\lambda}^{k}, \Sigma_{\lambda}^{k})$, for $k = \{a, \ldots, f\}$. The matrices Σ. are assumed to be diagonal matrices. The hyper-parameters contained in the (2 x 3) matrices $\bar{\delta}$ capture the intercept and main effects of the typicality contrasts (X_1 and X_2), and the main effect of the exposure duration (W), and interactions ($X_1 W$ and $X_2 W$). The hyper-parameters in the matrices $\bar{\beta}$ capture the main effects of accuracy and latency/certainty and their interactive effects with exposure duration on attitudes, and the hyper-parameters in the (2 x 2) matrix $\bar{\psi}$ represent the effects of ad attitude, its interactive effects with brand certainty and exposure duration, and their three-way interaction on brand attitude.

Direct and Indirect Effects (Moderated Mediation)

To obtain estimates of the direct effects of predictors (X, W, and XW) on the outcomes (M and Y), the model is estimated with β_{i} (the paths from the potential mediators to attitudes in equation (1) and (2)) and ψ_{i} (the path from ad to brand attitude in equation (2)) restricted to be zero. To take dependencies between ad and brand attitude into account, the constants in the regressions are allowed to co-vary: $\rho^{a,b} = \text{cov}(\delta_{i,1}^{a}, \delta_{i,1}^{b})$. The pair-wise comparisons for each of the ad-type pairs and the simple effects (i.e., the effect of exposure duration for each ad-type separately) are computed within the MCMC chain from the contrast-coded variables representing the ad typicality types and the appropriate parameters. This allows their posterior means and standard deviations to be computed. Posterior predictive distributions for ad and

brand attitudes are also computed within the MCMC chain, which enables us to produce figures 1 to 3.

To obtain estimates of the indirect (moderated mediation) effects, the full model is estimated and the products of the coefficients in question computed for every draw in the MCMC chain (Zhang, Wedel, and Pieters 2009). In addition, mediation effects are determined for each exposure condition separately (but estimated simultaneously).

Studies 1 and 2 contain restricted versions of the full model. Study 1 has no brand attitude component. Study 2 has no components for the mediators and brand attitude.

Data are analyzed with MCMC, using WinBugs (Lunn et al. 2000). Results are reported for 80,000 draws from which 1 in 10 are retained, after a burn-in of 20,000. Convergence was checked by inspection of the iteration plots of the hyper-parameters and was achieved well before the end of the burn-in, in all cases.

Chapter 3

Memory

This chapter shows that recall and recognition memory for ads crucially depend on ad typicality and the exposure duration, but in distinct ways. It demonstrates that typical ads are better recalled than atypical ads, but only after brief exposures. After longer exposures, there are no differences in recall memory between the ad types. In contrast, atypical ads are recognized with higher specificity than typical ads, but only after longer exposures. After brief exposures, recognition performance does not differ between typical and atypical ads. The findings show the advantage of being similar to other ads ("fitting in") in recall and the advantage of being dissimilar ("standing out") in recognition, and how these depend on the duration of exposure. This has implications for consumer memory theory and advertising practice.

Advertisers want to create memorable ads and brands. Building memory for ads and brands has positive downstream effects. Memory plays an important role in consumers' brand attitudes and choices for example (Cowley 2004; Keller 1987; Nedungadi 1990). Developing ads that stand out from the crowd of other ads – that are "atypical" – is commonly believed to be an effective way to accomplish memorability. Atypical ads deviate from expectations of what ads normally look like. Imagine, for example, two ads for cars: one ad displays a car in an outdoor scene and the other one shows a couple of space suits hanging to dry on a clothesline (the headline reads "Future Proof"). Which of these is more memorable, and why?

Atypical ads are commonly believed to enhance memorability because of their unexpectedness. Table 1 provides an overview of recent ad research on memory effects of unexpectedness in advertising. The studies investigate various forms of unexpectedness and measure memory in various ways. Ads that have unexpected pictorials (e.g., an ad for airline travel showing an elephant sitting comfortably in a seat; Heckler and Childers 1992), that use wordplay in their headline (e.g., "Berried Treasure" for strawberry shortcake; McQuarrie and Mick 2003), or that are placed in an unusual context (e.g., a shampoo ad in an interior decoration magazine; Moorman, Neijens, and Smit 2002) are a few of the many ways in which ads can be unexpected. Yet, almost all of these studies assert that unexpectedness should enhance memorability, and they offer essentially the same explanation. The general idea is that unexpectedness promotes elaborative processing to comprehend the ad, which in turn produces stronger memory traces. This elaborative processing is facilitated by the increased attention that unexpected ads receive (Pieters, Warlop, and Wedel 2002), but also influences memory directly. For the same amount of attention, unexpected ads promote more unique associative pathways to other information in memory, which increases the number of potential retrieval cues (Heckler and Childers 1992; Lee and Mason 1999; McQuarrie and Mick 1992; 2003; Pieters, Warlop, and Wedel 2002).

Consistent with this idea, 55%[8] of the tests performed in the studies in table 1 revealed better memory for unexpected as opposed to expected ads. In addition, several factors have been identified that moderate unexpectedness effects. These moderators mainly reveal conditions under which the memory advantage of unexpected ads vanishes (33%). Thus, in general, unexpected ads have been shown to

[8] Percentage of tests comparing memory for unexpected with memory for expected ads. To control for study size effects (the number of tests increases with the number of moderators and outcome variables in the study), the percentage is weighted by the number of tests per study.

Table 1. *Memory Effects of Unexpectedness*

Authors	Year	Journal	Unexpectedness	Study	# Ads	# Fillers	BS / WS manipulation (% unexpected)[e]	Exposure condition		Moderator		Effect of unexpectedness on	
								Fixed *vs.* free	Duration			Recall	Recognition
Heckler and Childers	1992	JCR	Picture-theme expectancy	S1	4	0	BS	Fixed	30s	Irrelevant pictorial		Pos (A), No (C)	Pos (A), No (C)
										Relevant pictorial		No (A,C)	Pos (A), No (C)
				S2	4	0	BS	Fixed	30s	Irrelevant pictorial		Pos (A), No (C)	NA
										Relevant pictorial		No (A,C)	NA
				S3	4	0	BS	Fixed	30s	Irrelevant pictorial		NA	Neg (A,C)
										Relevant pictorial		NA	No (A,C)
McQuarrie and Mick	1992	JCR	Resonance	S1	4	8	WS (50%)	Free (measured)	$M \approx 13$s			Pos (C)	NA
				S2	4	8	WS (50%)	Free	Unknown			Pos (C)	NA
Lee and Mason	1999	JCR	Picture-theme expectancy	S2	2	2	BS	Fixed	Unknown	Immediate	Irrelevant	Pos (A)	NA
											Relevant	No (A)	NA
										Delayed		Pos (A)	NA
Arias-Bolzmann, Chakraborty, and Mowen	2000	JA	Absurdity	S1	1	3	BS	Fixed	20s	Low category affect		Pos (B)	NA
										High category affect		Neg (B)	NA
Lee	2000	JA	Picture-theme expectancy	S1	2	2	BS	Fixed	Unknown			Pos (A)	NA
Toncar and Munch	2001	JA	Rhetorical figures	S1	1	0	BS	Unknown	Unknown	Low involvement		Pos (C)	NA
										High involvement		No (C)	NA
Moorman, Neijens, and Smit	2002	JA	Thematic incongruency	S1	3	[a]	WS (67% / 33%)	Free (incidental)	Unknown			NA	Neg (A)
Mothersbaugh, Huhmann, and Franke	2002	JCR	Rhetorical figures	S1	[b]	[b]	65%[b]	Free	Unknown			NA	Pos (C)
Pieters, Warlop, and Wedel	2002	MS	Originality	S1	58	[a]	WS (Unknown[f])	Free (measured)	$M \approx 1.5$s			NA	Pos (B)
Sengupta and Gorn	2002	JMR	Element omission	S1	1	7	BS	Fixed (manip.)	4s / 8s	Category-related omission		No (A,B)	NA
				S2	1	7	BS	Fixed (manip.)	4s / 8s	Brand-related omission		No (A), Pos (B)	NA

Table 1 *(continued).*

Authors	Year	Journal	Unexpectedness	Study	# Ads	# Fillers	BS / WS manipulation (% unexpected)[e]	Exposure condition		Moderator		Effect of unexpectedness on	
								Fixed *vs.* free	Duration			Recall	Recognition
Krishnan and Chakravarti	2003	JCP	Humor	S1	2	2[a]	BS	Free (directed *vs.* incidental)	Unknown	Directed		Inverted U (C)	Pos (C)
										Incidental		Inverted U (C)	Inverted U (C)
McQuarrie and Mick	2003	JCR	Rhetorical figures	S1	8	8[a]	WS (50%)	Free (directed *vs.* incidental)	Unknown	Directed	Visual	Pos (A)	NA
											Verbal	Pos (C)	NA
										Incidental	Visual	Pos (A)	NA
											Verbal	No (C)	NA
Lee and Ang	2003	ML	Picture expectancy	S1	5	0	BS	Fixed	15s			Pos (C)	NA
Ang , Lee, and Leong	2007	JAMS	Novelty	S1	3	0	BS	Unknown	Unknown			Pos (A)	NA
Kellaris and Cline	2007	P&M	Humor-expectancy	S1	1	0	BS	Unknown	Unknown	Low relevance / high Need For Humor:		No (C)	NA
										High relevance / low Need For Humor:		Pos (C)	NA
Baack, Wilson, and Till	2008	JA	Creativity	S1a	[c]	[c]	WS (Unknown[f])	Fixed	10s			Pos (A)	NA
				S1b	24	[d]	WS (Unknown[f])	Free (incidental)	Unknown			No (A)	NA
Sheinin, Varki, and Ashley	2011	JA	Ad novelty	S2	1	3	BS	Free	Unknown	Immediate		Pos (A), No (B)	NA
										Delayed		No (A,B)	NA
				S3	1	3	BS	Free	Unknown	Immediate		Pos (A), No (B)	NA
										Delayed		No (A,B)	NA

Note – Research on memory effects of various forms of unexpectedness in print ads, published in top-15 marketing journals (Steward and Lewis 2010) since 1990. The articles are selected based on keyword search in ABI/INFORM and JSTOR databases (keywords: unexpectedness, expectancy, deviates from expectations, novelty, creativity, atypicality, incongruency, incongruity, artful deviation, or divergence + memory + advertising). A = ad, B = brand, C = claim / copy. Effects of unexpectedness are significant at the 5% level. [a] Target ads were embedded in (a) real or mock magazine(s), with other ads and editorials as fillers. [b] Starch read most scores for 854 ads in 13 magazines. [c] 14 cinema ads which were presented (up to 6 times) in a slide show, before the movies. [d] Ads located in an airport terminal. [e] Between-participants (BS) vs. within-participants (WS) manipulation of unexpectedness. Proportion of unexpected target ads between parentheses (for WS-manipulations). The nature of the filler ads (expected vs. unexpected) is unknown in all cases. [f] Creativity is measured rather than manipulated. [g] Self-reported duration.

perform better than, or at least as good as expected ads (88%).

Creating unexpected ads is a common strategy to maximize attention and build memory for the ad and brand under highly competitive exposure conditions, given limited attention of consumers. It is therefore remarkable that memory effects are mostly tested under low levels of clutter, in between-subjects designs, and with surprisingly long (e.g., 30 seconds; Heckler and Childers 1992) or unknown exposure durations (see table 1). The present research aims to gain a better understanding of the effect of atypicality (a form of unexpectedness) on memory, by zooming in on the role of exposure duration. In practice, attention to ads is usually short, a few seconds at most, with the majority of ads receiving just a quick glance (Pieters and Wedel 2004; 2012). The duration of exposure is likely to play an important role in memory for typical and atypical ads, but has largely been ignored.

Furthermore, although it is generally acknowledged that recall and recognition represent distinct types of memory (Krishnan and Chakravarti 1999), ad research has used both as indicators of the elaborateness of ad processing (e.g., Heckler and Childers 1992). The present research aims to show that ad typicality and exposure duration affect recall and recognition memory in distinct ways. We extend the finding in psychology that common items, such as common words, are better recalled, whereas unique items, such as rare words, are better recognized (Gregg 1976; Karlsen and Snodgrass 2004). However, we argue and show that these advantages of being common or unique critically depend on the exposure duration. First, the theory and predictions are described. Then the results of three studies are presented that test the predictions.

Recall versus Recognition Memory

What happens when consumers try to remember the ads and brands they have been exposed to before? Generation and recognition are two fundamental processes in memory (Anderson and Bower 1972; Higham and Tam 2005; Jacoby and Hollingshead 1990; Watkins and Gardiner 1979). Generation involves a target search in memory. Based on internal or external retrieval cues, potential memory candidates are generated for identification as the target. Recognition involves a decision about whether or not a particular candidate is actually the target.

Sometimes consumers have to recall an ad or brand. Recall involves both generation and recognition processes (Anderson and Bower 1972; Watkins and Gardiner 1979). In recall, the target ad has to be searched for in memory, based on an

external context cue (e.g., "the magazine you just read") and/or other internally generated cues. If a potential memory candidate has been generated, a decision needs to be made on whether that candidate is actually the target ad. Sometimes the target ad itself is the memory cue, which precludes the need to generate potential candidates from memory. Then only a recognition decision ("Have I seen this ad before or not?") is required.

Recognition can be based on two types of information, namely recollection of specific content and global feelings of familiarity (Jacoby and Hollingshead 1990; Mandler 2008; Yonelinas 2002). Recollection involves the retrieval of specific information about a previous exposure (e.g., specific ad features or contextual information). Familiarity, in contrast, reflects a more global feeling of having encountered the ad before, without recollection of specific details. Recognition memory based on specific content (which we refer to as *specific recognition* in the remainder of this dissertation) is generally reflected in the ability not only to recognize ads that were seen before (high *accurate recognition*), but also to *discriminate* them from other memory traces and from other ads that were not seen before (low *false recognition*). Feelings of familiarity, in contrast, are often a poor basis for discrimination, because factors other than previous exposure may evoke familiarity feelings as well (Whittlesea 1993).

Different factors determine the quality of generation and discrimination processes (Hunt and Einstein 1981; Meyers-Levy 1991; Nairne 2006). Generation relies on the processing of similarities, i.e., on the processing of information in terms of the categories to which the target might belong. Discrimination relies on the processing of differences, i.e., on the processing of information unique to the target. Thus, whereas (specific) recognition memory benefits most from the processing of distinctive features, optimal recall memory requires the encoding of both common and unique information.

Ad Typicality Effects

Ad typicality is the degree to which an ad is representative of ads in a particular product category (Pieters and Wedel 2012). It determines what type of information – common or unique – is predominantly encoded and stored in memory. Typical ads share many features with the category prototype and thus with other typical ads for the same product category. As a result, they are closely connected to the category (e.g., "car ads") in memory. Since the category serves as an important

internal cue (Goodman 1980), typical ads should be more accessible in memory and thus easier to generate than atypical ads (Nairne 2006; Smith et al. 2000).

What about their discriminability? People can discriminate between targets and other ads based on feelings of familiarity ("This ad feels familiar") or recollection of specific content (e.g., "I remember the goldfish swimming in the martini glass"). However, familiarity is a poor basis for discriminating between old and new typical ads (Arndt and Reder 2003; Coane et al. 2011). Due to their similarity to other ads, typical ads feel familiar even if they are new, and it is difficult to separate the familiarity arising from previous exposure to the specific typical ad from the familiarity due to numerous previous exposures to similar exemplars (Coane et al. 2011). Thus, the processing of mostly common ad information in typical ads improves accurate recognition of presented ads, but it also increases the false recognition of non-presented ads (Arndt and Reder 2003).

In contrast to feelings of familiarity, the ability to recollect specific, distinctive ad features facilitates discrimination in recall and recognition (Dobbins et al. 1998; Malaviya, Kisielius, and Sternthal 1996; Mäntylä 1997). Due to their dissimilarity from the category prototype and from one another, atypical ads produce memory traces that are distinctive. This facilitates their discrimination (Hunt 1995; Nairne 2006; Schmidt 1996). In contrast, typical ads leave memory traces that are highly similar to those of other ads, hence their discriminability should be relatively poor.

Thus, whereas typical ads should be relatively easy to generate, but difficult to discriminate, the opposite is true for atypical ads. As a result, atypical ads should produce superior recognition memory, and typical ads should produce superior recall memory (Schmidt 1996; Smith et al. 2000; Watkins and Gardiner 1979).

However, a competing theory posits that atypical ads should be easier to generate than typical ads (Heckler and Childers 1992; Srull, Lichtenstein, and Rothbart 1985), leading to superior recall memory for atypical ads as well. The idea is that in trying to comprehend atypical ads, more associations are formed between the ad and other information in memory. This elaborative processing not only produces a more distinctive memory trace, it also enhances its accessibility by establishing a connection between the ad and the category (Hunt and Einstein 1981; Zaromb and Roediger 2009) and by increasing the number of potential retrieval paths (Heckler and Childers 1992; Srull, Lichtenstein, and Rothbart 1985).

We reconcile these competing theories by introducing the duration of exposure as a crucial moderator. We argue that people's ability to generate and discriminate (and thus to recall and recognize) typical and atypical ads both depend

on the exposure duration, but in very diverse ways. We distinguish between typical and two types of atypical ads, mystery and false front ads, as in chapter 2.

Exposure Duration Effects

Generation

Typical ads are similar to the category prototype in memory. This allows for almost instant product comprehension (chapter 2), which establishes an association between the ad and the identified product category in memory. Since other associations are limited after very brief exposures, the product category becomes an important internal cue to retrieve typical ads from memory.

In contrast, a brief glance is insufficient to integrate ad information from different locations and comprehend the advertised product category in mystery ads. As a result, the extracted information is unlikely to be stored well in long-term memory in the first place (Potter 1993). Moreover, if it is stored, the information is difficult to retrieve, because a connection to the category is lacking (Goodman 1980). Accessibility of mystery ads increases when exposure duration is prolonged. Mystery ads challenge the consumer to identify what they are about. This comprehension process produces a link between the mystery ad and the product, which increases its accessibility (Bransford and Johnson 1972; Zaromb and Roediger 2009). In addition, while trying to comprehend mystery ads, more associations are formed between the ad and existing knowledge, increasing the number of potential retrieval cues (Heckler and Childers 1992).

Finally, false front ads should be relatively easy to generate after only a brief exposure, because people immediately have a feeling of knowing what is being advertised, establishing a connection between the ad and the identified product category. However, in contrast to typical ads, their accessibility is based on an inaccurate ad-category association. This produces inaccurate recall memory; the ad is remembered to be for another type of product than is actually advertised. Prolonged exposure to the false front ad reveals the accurate category. This may enhance access to the ad's memory trace, because the ad is now cued by two categories, and additional retrieval paths are established as a result of people's effort toward comprehension. However, since less time is spent encoding either of the ad-category associations, the paths will be less strong, and this may leave false front ads more difficult to generate than typical and mystery ads.

Taken together, typical and false front ads should be easier to generate than mystery ads after brief exposures, but the accessibility of mystery ads should improve when exposure duration increases. After longer exposures, there either are no differences in accessibility of the three ad types, or false front ads are less accessible than typical and mystery ads.

Recognition: Discrimination

The ability to discriminate ads that were seen before from other memory traces and ads that were not seen before relies on the recollection of information that is unique to the ad. It depends on the duration of exposure, because "the more one knows about something, the less like other things it becomes" (Hunt 1995, p. 106). Discriminability of ads is generally poor when exposure duration is brief, but should improve as a result of prolonged ad processing (Dobbins and Kroll 2005; McClelland and Chappell 1998). This improvement will be relatively large for mystery and false front ads, which have many unique features that discriminate them from other ads (Loftus and Bell 1975). Typical ads, in contrast, remain difficult to discriminate even when exposure duration is long, because they share many of their features with other exemplars in the category. This may produce cue-overload in recall (Baddeley, Eysenck, and Anderson 2009): the category cue may provide access to memory traces of several typical category exemplars, but these are hard to discriminate from each other due to their similarity. In recognition, the similarity of typical ads to the category prototype and other ads makes them feel familiar, independent of whether they have been encountered before or not, and independent of the duration of exposure. Thus, whereas mystery and false front ads become increasingly easy to discriminate at longer exposure durations, discriminability of typical ads remains poor.

Taken together, discriminability should be poor for all three ad types after brief exposures. It should improve more for both types of atypical ads than for typical ads when exposure duration increases, resulting in higher discriminability of mystery and false front ads as compared to typical ads after longer exposures.

Recall and Recognition Memory: Predictions

Recall memory relies on the association between the ad and a product category in memory (facilitating generation) as well as the processing of unique ad features (facilitating discrimination). Based on the hypothesized effects of typicality on generation and discrimination, and their dependence on the duration of exposure, we predict the following. Typical ads (high accessibility, low discriminability) should

outperform mystery ads (low accessibility, low discriminability) in recall after brief exposure durations, but mystery ads (high accessibility, high discriminability) should outperform typical ads (high accessibility, low discriminability) after longer durations. Furthermore, we predict that false front ads (high accessibility, low discriminability) are recalled equally well as typical ads after brief durations. Thus, in addition to being practically relevant, false front ads are theoretically interesting because they can reveal the role of ad-category associative strength in recall memory after brief durations. However, in contrast to typical ads, recall is mostly inaccurate for false front ads after brief exposures: the ad is recalled as being for another product than is actually advertised. After longer durations, false front ads may perform as good as mystery ads, or worse. Although their discriminability should be high because of their uniqueness, their accessibility may be either high (because they are cued by two rather than one category) or low (due to their relatively weak connection to either category).

Specific recognition memory, in contrast, relies on the ability to discriminate but not on the ability to generate. Based on the predicted effects of typicality and duration on discrimination, specific recognition memory should be poor for all ad types after brief durations, and improve more for mystery and false front ads than for typical ads when exposure duration increases. After longer durations, specific recognition memory should be higher for both types of atypical ads than for typical ads.

Moreover, we predict that this pattern of specific recognition memory is mostly due to larger reductions in false recognition of atypical as compared to typical ads when exposure duration increases. Specifically, we predict that after brief exposures, accurate recognition memory is higher for typical than for atypical ads, because they feel more familiar. But, due to their familiarity, typical ads should have higher false recognition as well. As exposure durations become longer, the processing and subsequent recollection of the distinctive features of atypical ads facilitates their discrimination from other ads. This enhances accurate recognition of presented ads and reduces false recognition of non-presented ads. The feelings of familiarity evoked by typical ads continue to support their accurate recognition too, producing similar levels of accurate recognition for typical and atypical ads. However, familiarity also keeps false recognition of typical ads at high levels, even when exposure duration is long. Thus, accurate recognition should be higher for typical ads after brief exposures, and not different between ad types after longer exposures. False recognition should be higher for typical ads, after brief and long exposures.

Table 2. *Overview of Predictions*

	Recall				Recognition			
	Ad		Accurate image-plus-product		Accurate		False	
	Brief exposure	Long exposure	Brief exposure	Long exposure	Brief exposure	Long exposure	Brief exposure	Long exposure
Typical ads	Medium	Medium	Medium	Medium	Low	High	High	High
Mystery ads	Low	High	Low	High	Low	High	High	Low
False front ads	Medium	High	Low	High	Low	High	High	Low

Table 2 provides an overview of the predictions. In general, we predict that typical ads outperform atypical ads in (accurate) recall after brief durations, but that atypical ads perform as good as, or better than typical ads after longer durations. Furthermore, we predict that specific recognition memory is generally poor and not different between typical and atypical ads after brief exposures, but that atypical ads outperform typical ads in specific recognition after longer exposures. Joint support for these predictions would reveal the crucial role of the exposure duration in understanding the memory effects of typical and atypical ads. We conducted three studies to test the predictions.

Study 1

Study 1 examines the effect of ad typicality on recall and recognition memory, and how this depends on exposure duration.

Method

Participants and Design. One hundred and seventeen paid undergraduate students (M_{age} = 20.42, *SD* = 2.45, 40 females) participated. As in the studies in chapter 2, we employed a 4 x 3 mixed design, with exposure duration (100 msec., 500 msec., 2 seconds, and 10 seconds) as between-subjects factor, and ad typicality (typical, mystery, and false front) as within-subjects factor.

Stimuli. Twenty-four target ads were used in this study. The ad set is the same as in study 2 in chapter 2. The three ad types did not differ in brand familiarity (all brands were highly familiar: *M* = 4.69, min. = 4.33, max. = 4.95 on a 5-point scale), visual appeal, picture-text relevance, and visual complexity (see chapter 2), or size of the brand in cm^2 ($F < 1$).

Procedure and Measures. The experiment consisted of two parts. First, participants were informed that about 20 ads would be presented. To disguise the actual purpose of the study, participants were asked to evaluate the ads. The general set-up of a single trial was the same as in the studies in chapter 2. Each ad was preceded by a fixation cross (900 msec.) to direct eye gaze. After exposure to the ad for 100 msec., 500 msec., 2 seconds or 10 seconds, depending on the (between-subjects) exposure condition, a backward mask appeared for 80 msec. to prevent further processing. Next, ad attitude was measured on a scale from (1) *negative* to (7) *positive*.[9] Then, a black screen was shown for 300 msec., followed by a new fixation cross for the next trial. This procedure was repeated 24 times. Each participant received one of six ad sequences to control for order effects.

Then, after participation in unrelated studies for about 15 minutes in total, memory was assessed in terms of (1) unaided ad recall ("Describe as many ads as you recall having seen in the previous phase of the study"), (2) unaided brand recall ("Try to recall as many brand names from the ads you have seen before"), and (3) ad recognition ("Have you seen the exact same ad before or not?"), in that order. In the ad recognition task, 12 "old" (previously shown) and 12 "new" distracter ads, which were subtly changed versions of the remaining ads in the set, were randomly presented (see appendix A for examples). New but very similar pictorials replaced the pictorials in the target ads to form distracters. A pretest (N = 39) confirmed that the perceived similarity between target and distracter ads was equal across the three ad types (M_{typical} = 6.92; M_{mystery} = 6.72; $M_{\text{false front}}$ = 6.73; F < 1). The ad (target or distracter) remained on the screen until a response (*yes* or *no*) was made.

Coding Procedure and Analysis. In this and the next study, the unaided ad and brand recall data were coded by a trained, independent coder who was blind to the experimental conditions. For unaided ad recall, ad descriptions were scored as successful ad recall if they could be uniquely linked to an individual ad in the presented set (Baack, Wilson, and Till 2008). That is, ad recall requires the ability to generate ads and to discriminate them from other ads in the stimulus set (*item discrimination*) and from other ads that were seen before the study's session (*source discrimination*; Johnson, Hashtroudi, and Lindsay 1993). Descriptions that only included category information (e.g., "I remember seeing a car ad") and false recall are

[9] Ad attitude results replicate the findings in chapter 2. That is, attitudes are significantly more positive for typical (M = 4.8) and false front ads (M = 4.2) than for mystery ads (M = 3.8) after an exposure of 100 msec. After longer exposures, attitudes towards mystery ads sharply improve (slope = .20, CI = .15, .26), whereas attitudes towards false front ads drop (slope = -.10, CI = -.14, -.06). After an exposure of 10 sec., typical (M = 4.5) and mystery ads (M = 4.5) are liked equally well, and false front ads are liked significantly less (M = 3.9).

the result of failed item and source discrimination, respectively, and are not included in the ad recall measure.

Ad recall was further categorized into (1) accurate image-product recall (i.e., a description of the ad image and the advertised product and/or brand), (2) inaccurate image-product recall (i.e., a description of the ad image and a product and/or brand other than advertised), (3) image-only recall (i.e., a description of the ad image without mention of a product or brand, e.g. "A rainbow against a blue sky"), and (4) product-only recall (i.e., only the product and/or brand is mentioned). Our theory predicts that after brief exposures, ad recall is composed mostly of accurate image-product recall for typical ads, inaccurate image-product recall for false front ads, and image-only recall for mystery ads. After longer exposures, accurate image-product recall should be relatively high for all ad types.

To obtain a measure of specific recognition memory, recognition responses were scored "1" for targets that were correctly recognized (i.e., a "hit") and for distracters that were correctly rejected (i.e., a "correct rejection"), and "0" otherwise. Note that this "hits plus correct rejections" measure is conceptually equivalent to the more commonly used "hit rate minus false alarm rate" (Tashchian, White, and Pak 1988). Our measure is preferable here because it can be analyzed at the ad-and-person level, which provides more detail than the aggregate ad-level measures commonly used.

Because participants were exposed to multiple ads and there are multiple variables with different measurement scales (Y_1: ad recall is categorical, Y_2: brand recall is binary, Y_3: ad recognition is binary), a heterogeneous mixed-outcome regression model was developed and estimated using Bayesian procedures. Appendix B provides details about the model and the estimation procedure. Typicality (X) was manipulated within-participants and exposure duration (W) between-participants, resulting in a multi-level data structure. Typicality was coded through two orthogonal contrasts, namely X_1: typical = ⅓, mystery = ⅓, false front = -⅔, and X_2: typical = ½, mystery = -½, false front = 0. Exposure duration was coded linearly: 100 msec. = -1½, 500 msec. = -½, 2 sec. = ½, 10 sec. = 1½.

Interpretation of the results is straightforward. In all tables, estimates that are bolded (italicized) indicate 5% (10%) "significance" levels: the 95% (90%) posterior credible interval (CI) of the parameter estimate does not contain zero. In addition, we summarize the results in graphs. Credible intervals that do not overlap in the graphs are significantly different from each other at a 5% significance level (one-sided). For the dependent variables that are not represented in graphs, predicted means and 5- 95% credible intervals are provided in the text.

Results

Recall Memory. On average, participants recalled 4.4 ads and 4.0 brands (out of 24). Thirteen (out of 117) participants did not recall any of the ads or brands. Ad and brand recall depend on typicality, exposure duration, and their interaction, as predicted. In contrast to the common belief that unexpectedness enhances recall memory, the findings reveal the benefits of typical ads. Typical ads outperform mystery and false front ads when exposure duration is brief, and perform as good as mystery and false front ads when exposure duration is long. The results are summarized in table 3 and 4 and figure 1.

Ad recall for typical and false front ads should be relatively high after brief exposures, due to their similarity to a category prototype which allows for an immediate connection of the ad to a product category. As predicted, after brief 100-msec. exposures, ad recall is higher for typical ads than for mystery ads. Interestingly, and counter to the predictions, recall of false front ads is as low as that of mystery ads. Perhaps, false front ads were less "typical" for the intended false front category than typical ads were for the actual advertised category, producing a weaker connection between the ad and category in memory (this issue is returned to in study 2). When exposure duration increases, recall memory improves. As predicted, the improvement is largest for mystery ads (slope = .43, CI = .32, .55), and smallest for typical ads (slope = .12, CI = .02, .22). As a result, mystery ads close the gap with typical ads after exposures of 2 seconds. When duration increases to 10 seconds, there are no significant differences in recall memory between ad types anymore. These findings support the idea that the recall advantage for typical ads decreases when exposure duration is prolonged. However, they do not show the predicted superior recall for mystery ads after long exposures.

The pattern of results for accurate image-product recall (i.e., remembering what the ad looked like plus the advertised product or brand) is similar to that of ad recall, and as predicted. After exposure of 100 msec., about 60% of ad recall of typical ads (M = 63%, CI = 47, 78) is accurate. Since after such brief exposures, little is retrieved from mystery and false front ads in the first place, accurate image-product recall is very poor for these ad types (M = 8%, CI = 1, 20 and M = 12%, CI = 2, 28, respectively). When exposure duration increases, accurate recall significantly improves for mystery (slope = .74, CI = .43, 1.09) and false front ads (slope = .64, CI = .35, .97), but not for typical ads (slope = .08, CI = -.12, .29). After exposures of 10 seconds, about 70% of ad recall is accurate, and there are no differences between the three ad types.

Table 3. *Descriptive Results: Study 1 and 2*

	Study 1							
	Recall (%)							
	Ad				Brand			
	100 msec.	500 msec.	2 sec.	10 sec.	100 msec.	500 msec.	2 sec.	10 sec.
Typical	21.3	23.2	21.6	32.1	11.3	18.8	22.0	30.8
Mystery	4.2	15.6	21.1	34.6	2.1	14.7	16.8	33.3
False front	3.8	8.0	8.2	24.6	1.7	8.9	12.9	25.4
	Recognition (%)							
	Accurate				False			
	100 msec.	500 msec.	2 sec.	10 sec.	100 msec.	500 msec.	2 sec.	10 sec.
Typical	77.5	81.3	87.9	90.8	79.2	73.2	71.6	64.2
Mystery	55.0	79.5	95.7	91.7	54.2	74.1	50.9	29.2
False front	70.8	78.6	92.2	95.8	53.3	46.4	60.3	34.2

	Study 2			
	Category certainty (7-point)			
	100 msec.	500 msec.	2 sec.	10 sec.
Typical	6.5	6.5	6.8	6.9
Mystery	2.5	4.5	6.3	6.6
False front	5.5	5.4	6.2	6.4

	Recall (%)							
	Ad				Brand			
	100 msec.	500 msec.	2 sec.	10 sec.	100 msec.	500 msec.	2 sec.	10 sec.
Typical	26.9	28.9	25.4	23.7	5.3	18.3	26.6	27.1
Mystery	8.8	15.0	24.3	30.5	1.2	12.2	22.6	28.8
False front	19.3	20.0	31.6	32.2	0.0	15.6	29.4	32.2
	Composition of ad recall (% of ad recall)							
	Accurate image-product				Inaccurate image-product			
	100 msec.	500 msec.	2 sec.	10 sec.	100 msec.	500 msec.	2 sec.	10 sec.
Typical	67.4	71.2	68.9	81.0	6.5	5.8	15.6	7.1
Mystery	6.7	37.0	55.8	74.1	13.3	7.4	11.6	5.6
False front	3.0	44.4	67.9	80.7	51.5	30.6	14.3	10.5
	Image-only				Product-only			
	100 msec.	500 msec.	2 sec.	10 sec.	100 msec.	500 msec.	2 sec.	10 sec.
Typical	19.6	3.8	2.2	0.0	4.3	19.2	13.3	11.9
Mystery	80.0	37.0	9.3	0.0	0.0	18.5	23.3	20.4
False front	45.5	11.1	7.1	1.8	0.0	13.9	10.7	7.0

Note – Recall (study 1): percentage recalled of 8 targets per typicality type. Recognition (study 1): percentage hits of 4 targets per typicality type (accurate recognition), and percentage false alarms of 4 distracters per typicality type (false recognition). Recall (study 2): percentage recalled of 3 targets per typicality type.

Table 4. *Memory Effects: Study 1*

Predictors	Recall				Specific recognition	
	Ad		Brand			
	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*
Constant	**-1.102**	**.059**	**-1.220**	**.064**	**.355**	**.034**
X_1: Typical, Mystery *vs.* False front	**.515**	**.080**	**.354**	**.084**	**-.217**	**.056**
X_2: Typical *vs.* Mystery	**.314**	**.079**	**.282**	**.086**	**-.244**	**.059**
W: Duration	**.309**	**.052**	**.419**	**.056**	**.218**	**.031**
X_1W	-.097	.070	-.108	.073	.015	.050
X_2W	**-.313**	**.072**	**-.234**	**.079**	**-.199**	**.056**
Heterogeneity SD						
Constant	.479	.053	.519	.056	.250	.027
X_1	.226	.105	.213	.097	.171	.070
X_2	.309	.131	.347	.131	.121	.045

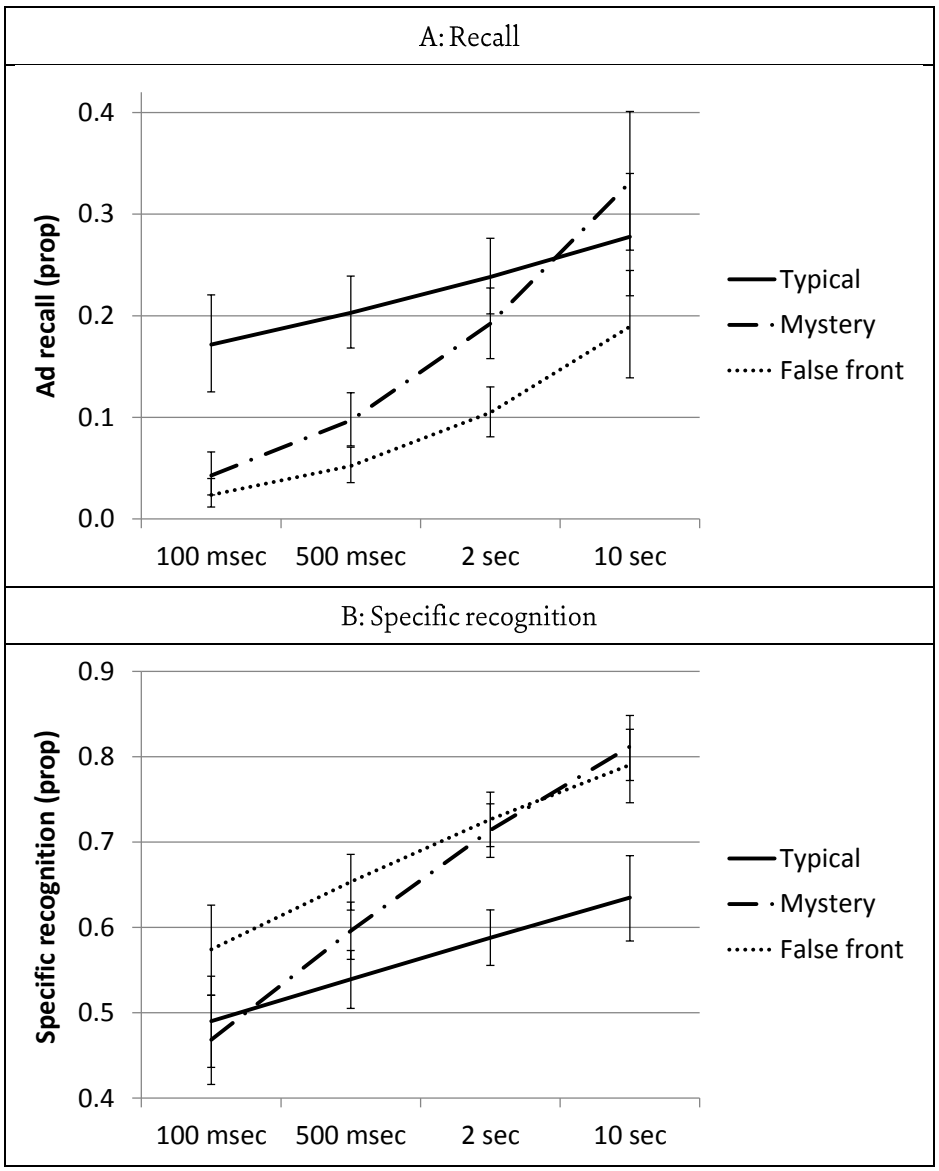
Note – Here and in other tables, recall: 1 = yes, 0 = no; recognition: 1 = accurate, 0 = inaccurate. Parameter estimates are means. Bolded (italicized) parameter estimates indicate that the estimate is significant at .95 (.90). Heterogeneity *SD* is the standard deviation of the distribution of the particular parameter estimate across individuals. Between-subjects correlation between ad and brand recall = .789 (*SD* = .056), between ad recall and recognition = .164 (*SD* = .138), and between brand recall and recognition = .121 (*SD* = .142).

The brand recall results mimic the ad recall results. That is, after a 100-msec. exposure, brand recall for typical ads (*M* = 9%, CI = 6, 12) is higher than brand recall for mystery (*M* = 2%, CI = 1, 4) and false front ads (*M* = 2%, CI =1, 3). When exposure duration increases, brand recall improves more for mystery ads (slope = .50, CI =.38, .63) and false front ads (slope = .49, CI = .36, .62) than for typical ads (slope = .27, CI = .16, .38). After exposures of 10 seconds, the difference between typical and both types of atypical ads has vanished. Then, typical (*M* = 29%, CI = 23, 35), mystery (*M* = 31%, CI = 24, 38), and false front ads (*M* = 24%, CI = 18, 30) have essentially the same level of brand recall.

Recognition Memory. Specific recognition memory (i.e., hits plus correct rejections) also depends on typicality, exposure duration, and their interaction (table 4), but the pattern of results is completely opposite to that of recall, supporting our predictions (figure 1). After an exposure of only 100 msec., specific ad recognition is poor, and does not differ between the ad types. When exposure duration becomes longer, specific recognition improves most for mystery ads (slope = .32, CI = .25, .40), and much less so for typical ads (slope = .12, CI = .05, .20). As a result, mystery and false front ads outperform typical ads in recognition after longer exposure durations of 2 and 10 seconds.

Further examination of accurate and false recognition reveals that the superior recognition memory for atypical ads is mostly due to lower false recognition, as predicted.

Figure 1. *Memory Effects: Study 1*



Accurate recognition is significantly influenced by exposure duration (W = .43, CI = .32, .53) and a typicality x exposure duration interaction (X_1W = -.05, CI = -.20, .11; X_2W= -.38, CI = -.56, -.19), and not by the main effect of typicality (X_1 = -.08, CI = -.27, .09; X_2 = .03, CI = -.18, .26). Due to their familiarity, typical ads (M = 81%, CI = 74, 88) are better recognized than mystery ads (M = 61%, CI = 52, 71) after 100-msec. exposures. Accurate recognition of false front ads falls in between (M = 72%, CI

= 64, 80). When exposure duration increases, there are no differences in accurate recognition between the ad types anymore, as predicted.

False recognition is significantly influenced by typicality (X_1 = .40, CI = .26, .54; X_2 = .62, CI = .46, .79) and exposure duration (W = -.20, CI = -.29, -.11), but not their interaction (X_1W = -.08, CI = -.20, .04; X_2W = .13, CI = 0, .27). Due to their familiarity, typical ads also have the highest level of false recognition after 100-msec. exposures (M = 82%, CI = 75, 87), followed by mystery (M = 68%, CI = 60, 76) and false front ads (M = 57%, CI = 48, 65). After longer exposures, false recognition of typical ads (M_{2sec} = 72%, CI = 67, 77; M_{10sec} = 67%, CI = 58, 75) remains higher than that of mystery (M_{2sec} = 46%, CI = 40, 52; M_{10sec} = 35%, CI = 27, 43) and false front ads (M_{2sec}= 45%, CI = 40, 51; M_{10sec} = 40%, CI = 31, 49), as predicted. Thus, typical ads remain more difficult to discriminate from similar, new ads than mystery and false front ads, even after a long exposure to them.

Taken together, the results show that recall and recognition memory for typical and atypical ads crucially depend on the duration of exposure, but in distinct ways. In fact, the recall and recognition patterns in figure 1 are exact mirror images, both horizontally (across exposure duration) and vertically (across typicality). The findings show that typical ads are better recalled than atypical ads, but only after brief exposures. After longer exposures, there are no differences in recall memory between the ad types. In contrast, atypical ads are recognized with higher specificity than typical ads, but only after longer exposures. After brief exposures, recognition performance does not differ between typical and atypical ads. These results largely confirm our predictions regarding the effect of ad typicality and exposure duration on memorability.

Study 2

Study 2 aims to provide more insight into recall memory for typical and atypical ads after brief and longer exposures. It uses a new set of ads and a new sample of participants. By holding all product and brand characteristics in the ads constant, this study aims to rule out alternative explanations for the recall effects of ad typicality. In addition, it provides more insight into the accuracy and elaborateness of ad recall.

Study 2 also tests whether ad-category associative strength mediates between typicality and recall memory, and whether this mediated effect is strongest after brief exposures. Since the discriminability of ads is relatively poor after brief exposures

(see study 1), recall memory should be more dependent on their accessibility, and thus on the strength of the association between ad and category.

In study 1, false front ads did not perform as good as typical ads did in ad recall after brief exposures. This seems to suggest that the ad-category association does not play a role in generation. Yet, the poor recall of false front ads in study 1 could also be due to other factors.

First of all, false front ads might produce a weaker association between the ad and (false front) category in memory than typical ads. Evidence for this is provided in chapter 2, where certainty about the identified product category – which reflects the strength of the association between ad and category – is somewhat lower for false front ads than for typical ads after brief exposures (see study 3, chapter 2). Nonetheless, recall of false front ads should be superior to that of mystery ads for which the ad-category association is likely to be completely lacking. In this study, we directly measure people's certainty about the identified category as an indicator of ad-category associative strength, and show its mediating role in ad recall and how this depends on the exposure duration.

Second, it could be that participants were able to generate false front ads in study 1, but withheld their responses because of their lower certainty (Koriat and Goldsmith 1996). Therefore, study 2 encouraged participants to report anything they remembered from the ads, and to provide as much detail as possible.

Method

Participants, Design, and Stimuli. Two hundred and thirty-five undergraduate students (M_{age} = 20.51, *SD* = 2.96, 80 females) participated in the study. The design was a 4 x 3 mixed design, with exposure duration (100 msec., 500 msec., 2 seconds, and 10 seconds) as between-subjects factor, and ad typicality (typical, mystery, and false front) as within-subjects factor. Twenty-seven target ads were used in this study. The ad set is the same as in study 3 in chapter 2. Here, ad typicality is manipulated through the pictorial element, while keeping everything else (i.e., headline, brand name, size and position, lay-out, etc.) constant.

The ads in study 1 were for highly familiar brands. This makes it difficult to distinguish actual brand recall from guessing (which would also favor highly familiar brands), which may have unduly benefited typical ads most. To avoid this, we used moderately familiar brands in this study (*M* = 3.52, min. = 2.82, max. = 4.05 on a 5-point scale). Brand familiarity did not differ across ad types by design.

Procedure and Measures. The first part of the study was the same as study 3 in chapter 2. Participants were exposed to typical, mystery and false front ads for 100

msec., 500 msec., 2 seconds, or 10 seconds, depending on the between-participants condition. After each ad, they indicated the advertised product category from six category names on the screen (locations were varied between-participants) and their certainty about the identified category ("I am … about this", on a response scale from (1) *absolutely not certain* to (7) *absolutely certain*). Then, brand certainty and ad and brand attitudes were assessed (see study 3, chapter 2 for details)[10].

After participation in unrelated studies for about 15 minutes in total, memory was assessed in terms of unaided ad recall ("Try to describe as many ads as you recall having seen") and unaided brand recall ("Try to recall as many brand names from the ads you have seen before"), in that order. The unaided ad recall task emphasized that it was important to provide very specific descriptions, and explicitly instructed participants to "describe all that you can remember from the ads, in as much detail as possible".

Analysis. A heterogeneous mixed-outcome model was estimated that appropriately handles the various measurement scales of the outcome variables (M_1: category certainty is ordered categorical, Y_1: ad recall is categorical, Y_2: brand recall is binary) and the multi-level data structure. Typicality and exposure duration were coded as before. Model details are provided in appendix B.

Results

On average, participants recalled 2.2 target ads and 1.7 target brands (out of 9). 26 (out of 235) participants did not recall any of the ads or brands. The results, summarized in table 5 and figure 2, largely support our predictions.

Ad recall is significantly influenced by typicality, exposure duration, and their interaction (table 5). After brief exposures of 100 and 500 msec., ad recall is higher for typical and false front ads than for mystery ads. When exposure duration becomes longer, recall memory improves for mystery (slope = .33, CI = .23, .44) and false front ads (slope = .18, CI = .08, .28), but not for typical ads (slope = -.05, CI = -.14, .04). After

[10] These measures are not of main interest in this chapter. The results replicate the previous findings. That is, after 100 msec. exposures, brand certainty and ad and brand attitudes are higher for typical (M = 4.1, 4.8, and 4.3, resp.) and false front ads (M = 2.9, 4.2, and 4.1) than for mystery ads (M = 1.8, 3.5, and 3.9). After longer exposures, brand certainty increases to equally high levels for all ad types. Ad and brand attitudes remain constant for typical ads ($slope_{ad}$ = 0, CI = -.08, .07; $slope_{brand}$ = .02, CI = -.06, .09), improve for mystery ads ($slope_{ad}$ = .27, CI = .20, .34; $slope_{brand}$ = .10, CI = .02, .17), and deteriorate for false front ads (although the drop in ad attitude is not significant: $slope_{ad}$ = -.07, CI = -.14, 0; $slope_{brand}$ = -.11, CI = -.19, -.04). After exposures of 10 sec., typical (M = 4.6, and 4.3, resp.) and mystery ads and their brands (M = 4.5 and 4.1) are liked significantly better than false front ads and their brands (M = 4.0 and 3.9, resp.).

exposures of 10 seconds, there are no differences between the three ad types anymore, as in study 1.

The higher level of recall for atypical ads after brief exposures in this study makes it possible to examine its composition in more detail (figure 2, bottom). Whereas typical and false front ads are relatively easy to recall, accurate image-product recall should be higher for typical than for false front ads. Indeed, after exposures of 100 msec., only 12% (CI = 6, 21) of ad recall is accurate for false front ads, as opposed to 71% (CI = 58, 82) for typical ads. As predicted, false front ads ($M_{100msec}$ = 45%, CI = 30, 60 and $M_{500msec}$ = 39%, CI = 29, 49) have significantly higher inaccurate image-product recall than typical ads ($M_{100msec}$ = 7%, CI = 3, 13 and $M_{500msec}$ = 8%, CI = 5, 13) after brief exposures of 100 and 500 msec. At such brief exposure durations, recall of mystery ads mostly consists of image-only recall ($M_{100msec}$ = 83%, CI = 67, 94 and $M_{500msec}$ = 41%, CI = 28, 55), as predicted, which constitutes a much smaller part of recall for false front ads ($M_{100msec}$ = 42%, CI = 25, 58 and $M_{500msec}$ = 18%, CI = 11, 26) and typical ads ($M_{100msec}$ = 18%, CI = 9, 29 and $M_{500msec}$ = 5%, CI = 3, 9). After longer exposures of 2 and 10 seconds, levels of accurate and inaccurate image-product recall and image-only recall are not significantly different across the ad types.

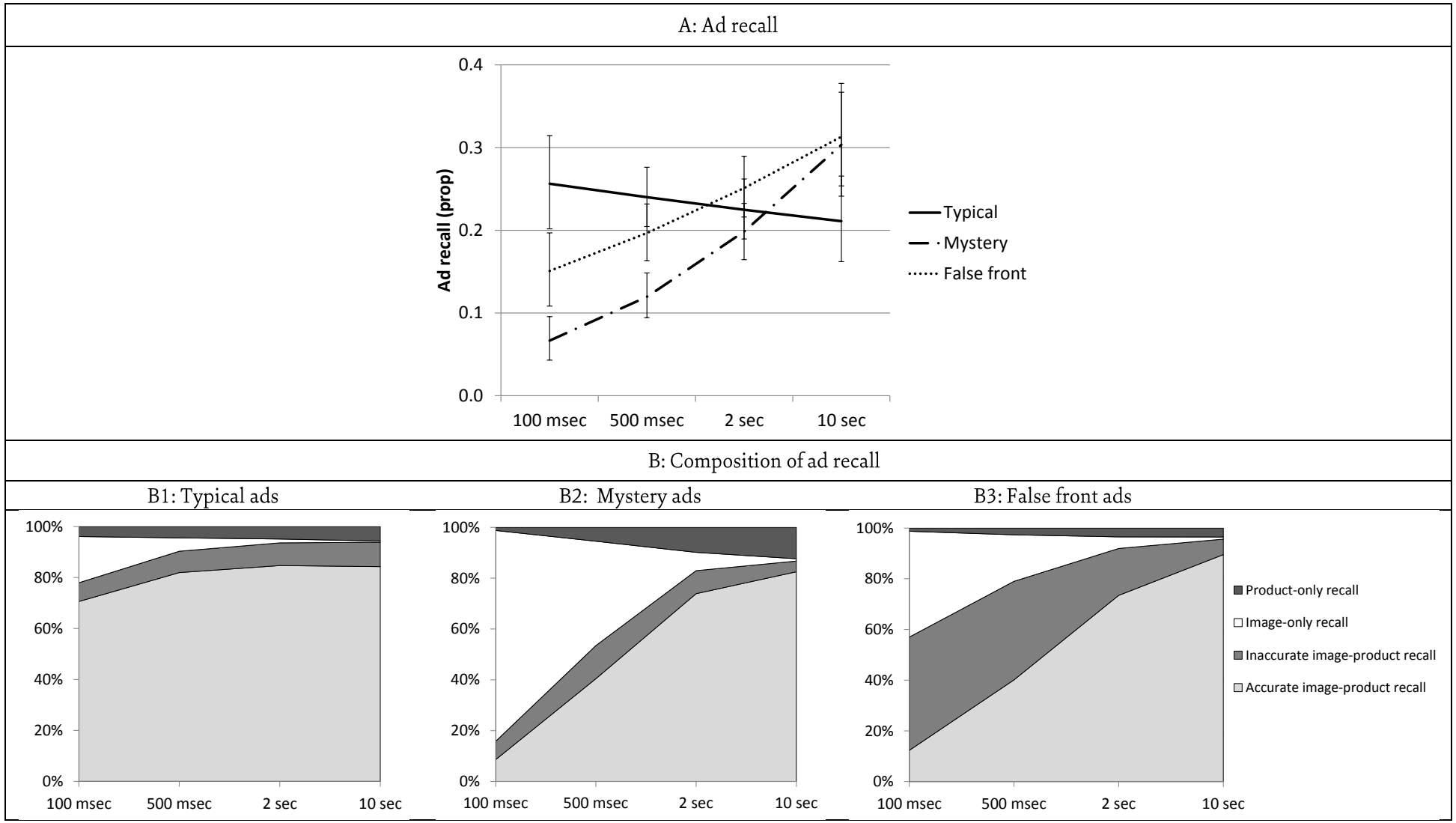
Finally, brand recall is significantly influenced by typicality, exposure duration, and the predicted interaction (table 5). The pattern of results is the same as before (table 3), but the differences are smaller than in study 1. After short exposures, recall of brands in typical ads ($M_{100msec}$ = 7%, CI = 4, 10 and $M_{500msec}$ = 12%, CI = 9, 15) is directionally higher than recall of brands in mystery ($M_{100msec}$ = 2%, CI = 1, 4 and $M_{500msec}$ = 7%, CI = 5, 9) and false front ads ($M_{100msec}$ = 3%, CI = 1, 5 and $M_{500msec}$ = 8%, CI = 6, 11), but the credible intervals overlap. Our explicit instruction to describe the ads in as much detail as possible may have encouraged participants to name the advertised brands during unaided ad recall, which may have reduced their motivation to repeat them during brand recall. Indeed, further analysis of the brands that were mentioned during unaided ad recall reveals the predicted typicality x exposure duration interaction (X_2W = -.33, CI = -.47, -.17), with brand recall being higher for typical ($M_{100msec}$ = 6%, CI = 3, 8 and $M_{500msec}$ = 9%, CI = 7, 11) than for atypical ads (mystery: $M_{100msec}$ = 1%, CI = 0, 2 and $M_{500msec}$ = 3%, CI = 2, 5; false front: $M_{100msec}$ = 1%, CI = 1, 3 and $M_{500msec}$ = 5%, CI = 3, 6) after short exposures, but not after long exposures.

Table 5. *Memory Effects: Study 2*

Predictors	Category certainty		Ad recall		Composition of Ad recall						Brand recall	
					Inaccurate image-product		Image-only		Product-only			
	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*
Constant	**2.355**	**.080**	**-.838**	**.050**	**-1.567**	**.232**	**-2.182**	**.292**	**-2.755**	**.510**	**-1.128**	**.053**
X_1: Typical, Mystery *vs.* False front	**.263**	**.069**	-.110	.069	**-1.274**	**.345**	-.521	.424	.479	.553	-.008	.095
X_2: Typical *vs.* Mystery	**1.391**	**.093**	**.283**	**.082**	-.643	.433	**-2.303**	**.512**	-.884	.584	**.226**	**.092**
W: Duration	**.576**	**.045**	**.155**	**.044**	**-.775**	**.180**	**-1.968**	**.245**	-.040	.286	**.470**	**.049**
X_1W	**.342**	**.060**	-.042	.063	**.895**	**.351**	.146	.493	.347	.514	-.124	.081
X_2W	**-.585**	**.083**	**-.381**	**.067**	**.999**	**.466**	1.048	.580	-.008	.518	**-.179**	**.092**
Heterogeneity SD												
Constant	.541	.050	.547	.050	.566	.360	.602	.369	2.170	.493	.479	.050
X_1	.347	.140	.226	.099	.547	.484	.665	.559	1.114	.809	.215	.093
X_2	.486	.152	.156	.070	.701	.653	.572	.530	1.414	1.016	.205	.100

Note – Accurate image-product recall is the baseline category. Between-subjects correlation between ad and brand recall = .706 (*SD* = .075).

Figure 2. *Memory Effects: Study 2*

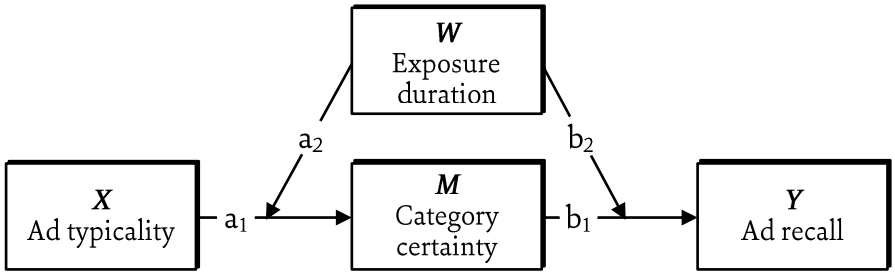


Ad-Category Associative Strength: Moderated Mediation. We predicted that the effect of ad typicality on ad recall is mediated by the strength of the ad-category association, and that this mediated effect is stronger after brief than after longer exposures. High certainty about the identified product category reflects a strong ad-category association. Table 5 shows that category certainty is influenced by typicality, exposure duration, and their interaction. The results replicate those of study 3 in chapter 2. That is, after 100-msec. exposures, certainty about the advertised product is highest for typical ads (M = 6.5, CI = 6.3, 6.6), somewhat lower for false front ads (M = 5.3, CI = 5.1, 5.6), and much lower for mystery ads (M = 2.7, CI = 2.5, 3.0). When exposure duration increases, certainty sharply increases for mystery ads (slope = .98, CI = .88, 1.08). It increases less for typical (slope = .40, CI = .28, .52) and false front ads (slope = .35, CI = .26, .44), because of their high initial certainty levels. After 10 seconds of exposure, certainty about the advertised product category is at ceiling levels for all three ad types ($M_{typical}$ = 6.9, CI = 6.9, 7.0; $M_{mystery}$ = 6.8, CI = 6.8, 6.9; $M_{false\ front}$ = 6.6, CI = 6.4, 6.7).

We developed a Bayesian moderated mediation model (Zhang, Wedel, and Pieters 2009) to test the prediction that category certainty mediates between typicality and ad recall, particularly after brief exposures. The model handles mediator (M) and outcome variables (Y) with different measurement scales (M: category certainty is ordered categorical, Y: recall is binary), and properly estimates the indirect effects, while taking into account heterogeneity in participants' responses. For ease of interpretation, the indirect effects are estimated for each contrast of ad types (X: typical *vs.* mystery, false front *vs.* mystery, and typical *vs.* false front). Appendix B describes the model.

Table 6 shows the results for the three typicality contrasts. It shows the mediated effect for each exposure duration condition separately, and provides an overall test of whether the mediated effect significantly depends on the duration of exposure (i.e., a moderated mediation test). As predicted, category certainty mediates between typicality and ad recall after brief exposures (table 6, upper part). When exposure duration increases, the size of the mediated effect decreases (although not significantly for the contrast of typical with false front ads; table 6, lower part), to become insignificant after 2 seconds (for the contrast of false front with mystery ads) or 10 seconds (for the remaining contrasts). This supports the hypothesis that ad recall relies on the similarity between the ad and the prototype of a category because of the immediate ad-category association it promotes. As predicted, this role of ad-category associative strength in recall memory becomes less important as exposure duration increases and the ad-category connection is established for all ad types.

Table 6. *Moderated Mediation: Study 2*



	Typical *vs.* Mystery		False front *vs.* Mystery		Typical *vs.* False front	
	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*
Mediation per exposure duration condition (*W*):						
100 msec.	**.247**	**.099**	**.146**	**.055**	**.211**	**.056**
500 msec.	**.145**	**.049**	**.063**	**.021**	**.170**	**.041**
2 seconds	**.070**	**.037**	.008	.007	**.123**	**.048**
10 seconds	.022	.030	-.019	.028	.071	.073
Moderation of mediation by exposure duration (*W*):	*-.075*	*.038*	**-.055**	**.018**	-.061	.032

Note – Mediation and moderated mediation effects (a1 x b2 + a2 x b1) are estimated while controlling for all other effects as per appendix B. Bolded (italicized) parameter estimates indicate that the estimate is significant at .95 (.90).

Taken together, the findings provide additional evidence that recall memory for typical and atypical ads depends on the duration of exposure. They show that after brief exposures, typical and false front ads are recalled better than mystery ads, and reveal the role of ad-category associative strength in recall memory. Typical and false front ads differ in the accuracy of their memories, however. Whereas recall of typical ads is mostly accurate, accurate recall of false front ads is poor and not different from that of mystery ads. Prolonged exposure sharply improves (accurate) recall memory for atypical ads, such that recall levels are essentially the same for the three ad types after long exposures.

Study 3

Study 3 has two main goals. First, it aims to rule out the alternative explanation that the poor recall memory of mystery ads after brief exposures is due to their competition with typical ads, rather than due to their low ad-category associative

strength. In study 1 and 2, participants were exposed to a mix of typical and atypical ads. At brief exposures, the "strength" or salience of typical ads may have inhibited memory for atypical ads (Bäuml 1998). Study 3 aims to rule this out.

Second, it provides more insight into false memory. Consumers may fail to discriminate the target ads and brands from other ads and brands they have seen before, which may lead to false memory for ads or brands that were not presented. One might predict that exposure to typical ads induces more false recall than exposure to atypical ads due to their similarity to other non-presented ads (Smith et al. 2000). Moreover, instant identification of the advertised product in typical ads might increase the feeling of knowing the brand independent of its accuracy. This would not only raise successful brand recall but also increase false brand recall. Exposure to an ad for the target brand might then benefit competing brands, which would not only render the ad ineffective, but even counterproductive. Such brand confusion might undermine the benefits of typical ads as shown in the previous studies, where – due to the within-subjects manipulation of ad typicality – false memories based on exposure to typical ads could not be disentangled from those based on exposure to atypical ads.

To rule out the competition explanation and disentangle false memory for typical and atypical ads, ad typicality is manipulated between-subjects in this study.

Method

Participants, Design, and Stimuli. One hundred and fifty-eight undergraduate students (M_{age} = 20.37, *SD* = 3.62, 61 females) were randomly assigned to a 2 (Ad typicality: typical *vs.* mystery) x 4 (Exposure duration: 100 msec., 500 msec., 2 seconds, 10 seconds) between-subjects design. Since being exposed to a large number of false front ads may raise suspicion, we only used typical and mystery ads in this study. Thirty-two ads were used, including 23 new ads that were specially designed for this study. The typical and atypical ad sets contained ads for 16 familiar brands (as established by a pretest: *M* = 4.60 on a 5-point scale; min. = 3.81, max. = 4.94; *N* = 16). There were four ad replicates in each of four product categories (food, beverages, fragrances, and tooth care). The ads are in appendix C.

Pretests in which participants rated the ads on typicality (*N* = 16), comprehension (*N* = 13), and creativity (*N* = 16) established that typical ads looked more like other ads in the same category (*M* = 3.70; $F(1, 30) = 47.50$, $p < .001$) and were easier to identify (*M* = 4.66; $F(1, 30) = 112.69$, $p < .001$) than mystery ads (*M* = 2.24 and 2.67). Mystery ads were judged to be more original (*M* = 3.76; $F(1, 30) = 66.44$, $p < .001$), more difficult to comprehend (*M* = 2.37; $F(1, 30) = 17.46$, $p < .001$)

and to require more time (M = 2.63; $F(1, 30)$ = 35.17, p < .001) than typical ads (M = 2.31, M = 1.51, and M = 1.44). Two additional pretests (N = 19 and N = 20) confirmed that the ad types did not differ in visual appeal ($M_{typical}$ = 3.00 and $M_{mystery}$ = 3.15) and picture-text relevance ($M_{typical}$ = 3.31 and $M_{mystery}$ = 3.23; Fs < 1). Visual complexity of the ads was assessed using the file-size of the JPEG-compressed ad image, and did not differ between ad types ($M_{typical}$ = 200kb and $M_{mystery}$ = 196kb; F < 1). Brand characteristics are constant by design.

Procedure, Measures and Analysis. The set-up of the study was the same as before, but participants now either viewed 16 typical ads or 16 mystery ads. Memory was assessed in terms of unaided ad recall ("Try to describe as many ads as you recall having seen") and unaided brand recall ("Try to recall as many brand names from the ads you have seen before"). In this study, corrected ad and brand recall measures were used where for each participant false recall was subtracted from accurate recall (Congleton and Rajaram 2012). Poisson regressions were estimated for accurate and false ad and brand recall which are count variables, and linear regressions for corrected ad and brand recall, with typicality (X: typical = ½, mystery = -½), exposure duration (W: 100 msec. = -1½, 500 msec. = -½, 2 sec. = ½, 10 sec. = 1½), and their interaction as predictors.

Results

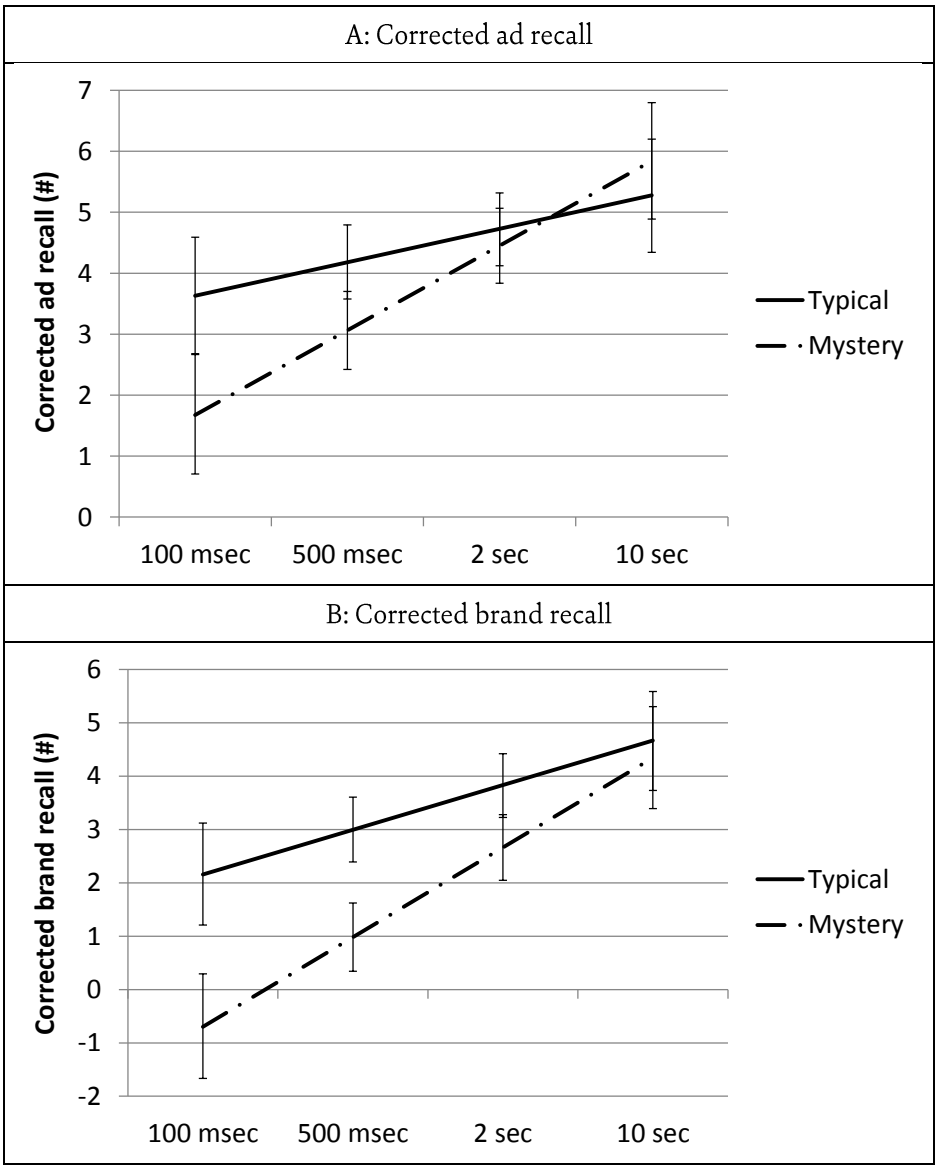
The results are summarized in table 7 and figure 3. On average, participants successfully recalled 4.6 ads and 3.4 brands and falsely recalled .4 ads and .7 brands. Four participants (out of 158) did not recall any ad or brand.

Table 7. *Descriptive Results: Study 3*

	Accurate recall (#)							
	Ad				Brand			
	100 msec.	500 msec.	2 sec.	10 sec.	100 msec.	500 msec.	2 sec.	10 sec.
Typical	3.9	4.5	5.5	5.2	2.8	3.6	4.5	6.0
Mystery	2.6	3.6	4.4	6.7	.1	1.9	3.0	4.9

	False recall (#)							
	Ad				Brand			
	100 msec.	500 msec.	2 sec.	10 sec.	100 msec.	500 msec.	2 sec.	10 sec.
Typical	.5	.2	.3	.3	.5	.7	.9	1.1
Mystery	.5	.6	1.0	.1	1.1	.3	.7	.6

Figure 3. *Memory Effects: Study 3*



False Recall. False ad recall is significantly influenced by ad typicality (X = -.56, CI = -.98, -.14) but not by exposure duration (W = -.15, CI = -.34, .04) or the interaction (XW = .05, CI = -.35, .42). Surprisingly, false ad is recall higher for participants who viewed mystery ads (M = .31) as compared to typical ads (M = .54), but the difference seems to be driven by a relatively high level of false recall for mystery ads in the 2-seconds condition. False brand recall, in contrast, is significantly influenced by the interaction between typicality and exposure duration (XW = .45 , CI = .16, .73), and not by their main effects (X = .18 , CI = -.13, .48; W = .03, CI = -.11, .18). As expected, false brand recall is higher for typical ads than for mystery ads, but the difference is only significant in the 10-seconds condition (estimate = .85, CI = .34, 1.37). If exposure duration becomes shorter, the difference becomes smaller and the

effect almost reverses after 100-msec. exposures (estimate = -.49 , CI = -1.03, .04). Thus, false brand memory is less common for mystery ads than for typical ads after long exposures, but not after brief exposures. A brief glance at a mystery ad may motivate consumers to think about what is advertised in order to reduce uncertainty, but the probability of being accurate will be relatively low, which might raise false brand recall later on.

Importantly, taking false memory into account does not change the pattern of results for the corrected measures of ad and brand recall (figure 3), which parallel the findings of the previous studies. That is, after brief exposures of 100 msec., corrected recall is higher for typical ads (M_{ad} = 3.6, CI = 2.7, 4.6; M_{brand} = 2.2, CI = 1.5, 2.9) than for mystery ads (M_{ad} = 1.7, CI = .7, 2.7; M_{brand} = -.7, CI = -1.4, 0). When exposure duration becomes longer, corrected recall memory sharply improves for mystery ads ($slope_{ad}$ = 1.39, CI = .87, 1.91; $slope_{brand}$ = 1.68, CI = 1.30, 2.07), but less so for typical ads ($slope_{ad}$ = .55, CI = .05, 1.06; $slope_{brand}$ = .84, CI = .46, 1.21), such that there are no differences between typical and mystery ads after exposures of 500 msec. and 2 seconds for ad recall and brand recall, respectively.

The findings demonstrate that taking into account false memory does not eliminate the advantage of typical ads in recall after brief exposures. Moreover, the fact that we obtain similar results with a between-subjects manipulation of ad typicality rules out that the early recall advantage of typical ads is due to competition between the ad types.

General Discussion

People generally believe atypical, distinctive stimuli to be more memorable than typical, common stimuli (Ghetti 2003). Atypical ads are unique. They are dissimilar from other ads, which makes them stand out more. In contrast, typical ads are usual and expected. They are similar to many other ads for the same product category, and therefore should be less memorable, is the general idea.

Our findings reveal that this general intuition that atypical stimuli are more memorable than typical stimuli requires revision. Our studies demonstrate the decisive role of exposure duration in memory for typical and atypical ads. Accurate recall is higher for typical than for atypical ads after brief but not after long exposures, and recognition is higher for atypical than for typical ads after long but not after brief exposures.

More specifically, typical ads outperform mystery and false front ads in accurate recall after brief exposures. Due to their similarity to a prototype and other ads, the product category in typical and false front ads is immediately identified upon exposure to them, and this ad-category association facilitates retrieval (producing inaccurate recall for false front ads, however). Mystery ads close the gap with typical ads after longer exposure durations, but do not outperform them. The findings reveal the importance of memory accessibility in recall, particularly after brief exposures. Specific recognition memory, which relies on distinctive information, is generally poor for all ad types after brief exposures. Extended exposure allows for the encoding of distinctive ad features, which improves recognition. After longer exposures, recognition memory is better for mystery and false front ads, which have more distinctive features than typical ads.

Recall Memory

Consumers often make choices based on information retrieved from memory. Information accessibility plays an important role in such memory-based choices (Biehal and Chakravarti 1983; Menon and Raghubir 2003; Nedungadi 1990). Consumers' choice depends on which brands and what information about those brands comes to mind. This research shows that typical ads and the brands they advertise are better recalled than atypical ads and their brands, particularly under common brief exposure conditions. Typical ads do not require sustained attention in order to develop memory traces for the ad and brand. Even a cursory glance, when quickly moving past a billboard or flipping pages of a magazine, for example, may already be enough for a typical ad to build memory and to give them an accessibility-based advantage in memory-based choice.

Atypical ads, in contrast, require longer exposure durations. Recall memory for these ads is initially poor, but sharply improves if exposure to them is prolonged. Counter to the predictions, even after an exposure of 10 seconds – which is much longer than average durations in practice (Pieters and Wedel 2004) – atypical ads did not outperform typical ads in the present studies. To further explore the role of ad distinctiveness in ad recall memory after longer exposure durations, we regressed the ad recall scores of study 2 on the pretest ratings of their similarity to other ads and the exposure duration. The results revealed the predicted interaction between similarity and duration (estimate = -.16, z = -5.77, p < .001). After brief exposures, ads that are more similar to other ads (i.e., that are more typical) have higher recall performance ($estimate_{100ms}$ = .25, z = 3.81, p < .001). After longer exposures, ads that are less similar to other ads (i.e., that are more unique) have higher recall performance

(estimate$_{10sec}$ = -.21, z = -3.45, p < .01). This provides further evidence for the role of similarity and dissimilarity in recall memory for ads after brief and longer exposures, and shows the usefulness of using graded ad typicality scores in follow-up research.

This research demonstrated that the almost instant association between the ad and the advertised product category promotes retrieval of typical ads after brief exposure. But why does it lead to better memory for the brands advertised in these ads? First, the information that can be extracted in a glance from ads is more likely to reveal the brand for typical than for atypical ads. Consistent with this, the early advantage of typical ads in brand recall was mitigated when the advertised brands were less familiar (study 2). Furthermore, typical ads generally have larger brand names than atypical ads, and for many categories the product itself is represented in the ad schema (think of car ads, for example), which may facilitate rapid brand identification. Controlling for these factors did not eliminate the difference in brand recall for typical and atypical ads after brief exposures, however. Even if there are no differences in brand identification between typical and atypical ads during brief exposures (see Pieters and Wedel 2012), subsequent recall is likely to be higher for brands in typical ads because these are more likely to become part of an interconnected set of ad-category-brand associations in memory, and hence more accessible.

Recognition Memory

The ability to discriminate old from new but similar ads reflects memory for specific content. It relies on the processing of distinctive ad features, which requires attention to them. Due to their dissimilarity from other ads, exposure to atypical ads sharply improves their discriminative value. Recognition performance of typical ads is limited due to the generality of their ad features, and might be improved by the use of specific and distinctive ad tags.

Recognition of ads or ad elements that are repeated in-store influences consumers' choices (Keller 1987). Particularly in situations where knowledge is limited, recognition may be used as a choice heuristic. In that case, it is the subjective feeling of recognition that influences attitudes and choices, regardless of whether the feeling is justified (Cowley 2004; Obermiller 1985). General feelings of familiarity evoked by the ad and specific recollection of its content both increase consumers' belief that they have seen the ad before. Atypical ads may therefore not be able to exploit their discrimination advantage in such situations. In fact, typical ads may be more effective because they do not require previous exposure to evoke feelings of familiarity.

Ad recognition is a popular measure of ad effectiveness in academic advertising research and in advertising practice, perhaps because recognition tests are easy to administer, and their results easy to analyze and compare. Recognition scores are assumed to directly reflect consumers' attention to advertising during prior exposure (Baack, Wilson, and Till 2008). Recent research by Aribarg, Pieters, and Wedel (2010) shows that factors other than the amount of attention contribute to claimed recognition as well, which undermines the validity of recognition tests as direct measures of attention. Consistent with their findings, our research demonstrates that the relationship between attention and recognition memory depends on ad typicality. Ad recognition is more diagnostic for prior attention during exposure for atypical than for typical ads.

The present research emphasizes that using recognition tests as a single measure to gauge ad effectiveness provides only limited insights. It may even provide misleading results if consumers' actual preferences or choices rely more on information accessibility than on recognition. Outcomes of recall and recognition tests are influenced in very diverse ways by ad characteristics such as ad typicality. Moreover, they heavily depend on the duration of ad exposure: even small changes in exposure duration may lead to remarkable changes in memory. This reveals the importance of matching ad testing conditions to exposure conditions in practice.

Relationship to Other Research

Our theory and findings build on Hunt and colleagues' relational/item-specific processing framework (Hunt 1995; Hunt and Einstein 1981; Nairne 2006), which emphasizes the joint contribution of encoding common and unique stimulus information to recall memory. Specific stimulus characteristics (such as typicality) as well as processing goals determine what type of information – common, unique, or both – is processed during exposure, with recall memory being highest when both types of information are processed. The present research extends this literature by revealing the crucial role of exposure duration in the encoding of common and unique information. Our research also has parallels in the visual memory literature (Hollingworth 2005; Konkle et al. 2010). Research in that domain proposes that immediate category knowledge supports high memory performance by directing attention to information that is likely to discriminate between category exemplars. Without the support of category knowledge (similarities), memory for item-specific information (differences) is impaired (Konkle et al. 2010). However, these studies do not systematically vary the exposure duration, and use only typical stimuli.

Other research finds that common information is processed more slowly than unique information (Clark and Shiffrin 1992). The crucial difference seems to be the type of (dis)similarity that is examined. Stimuli can be dissimilar from other stimuli in the immediate context (referred to as "primary distinctiveness") or from general knowledge stored in long-term memory ("secondary distinctiveness"; Schmidt 1996). If stimuli are atypical relative to other stimuli in their immediate context (e.g., a car ad in a series of food product ads), similarities only emerge after multiple individual stimuli have been processed. In contrast, atypicality in the present research is a form of secondary distinctiveness, that is relatively independent of its immediate context. Atypical ads deviate from general knowledge about what ads for the specific category typically look like. They remain atypical even when they are surrounded by many other atypical ads, because these other ads are also dissimilar from each other. In this case, the speed of processing of common (category) information in ads is high, and unique information takes more time.

It is important to note that our findings are in fact not inconsistent with the explanations for the memory effects of unexpectedness that previous ad research has offered (Heckler and Childers 1992; Pieters, Warlop, and Wedel 2002), but instead provide a more complete picture. Indeed, increased exposure duration, which allows for more elaboration, produces relatively steep improvements in recall and recognition memory for atypical ads, and much smaller or no improvements for typical ads. Furthermore, note that atypical ads retain attention longer than typical ads under self-controlled exposure conditions (chapter 2), which should also enhance their memory performance. This is consistent with the direct and indirect effects of unexpectedness on memory, as proposed by previous research.

However, their immediate ad-category connection gives typical ads a head start in recall memory. Thus, even though typical ads benefit much less than atypical ads do from additional exposure duration, they outperform the latter in recall after brief exposures and still perform as good as atypical ads after longer exposures.

Exposure durations were fixed in the present studies. If atypical ads draw much more attention than typical ads under self-controlled exposure conditions, they might outperform them in recall. The present results render this possibility highly unlikely, however. Assuming that the memory processes are the same under self-controlled exposure conditions, atypical ads must retain attention longer than 10 seconds to beat an exposure of less than a second to typical ads. Average self-controlled exposure durations in chapter 2 were about 4 seconds for typical ads and about 5 seconds for atypical ads. This suggests that recall performance of atypical ads

will be as good as, but not better than that of typical ads when exposure is self-controlled.

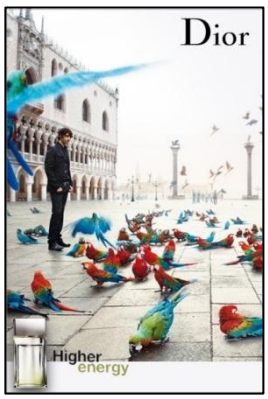
Concluding Remarks

Michael Ray (1977) argued already early on that the conditions of ad research are often different from typical ad exposure situations in practice, and he questioned the general applicability of ad research because of this. For example, whereas in reality ad clutter is typically high and exposure duration short, table 1 revealed that ad research on memory effects of unexpectedness is mostly conducted in contexts with low clutter and much longer exposure durations. In practice, people may indeed only rarely experience the inordinately long ad exposure durations with few ads that are common in academic advertising research.

The present research examined memory effects after common brief exposure durations from 100 msec. up to 10 seconds, and demonstrated that even small differences in exposure duration lead to remarkable changes in ad effectiveness. This crucial role of exposure duration in the effectiveness of typical versus atypical ads has largely been ignored, perhaps because of the general idea that atypical ads have the unequivocal ability to grab and retain attention longer than typical ads. However, due to rising levels of media clutter, fast-paced in-store and outdoor exposure conditions, and ad avoidance strategies of consumers, it is increasingly difficult for ads to attract and retain attention. Acknowledging this, ad research has started to examine the effectiveness of ad strategies in breaking through the clutter and maximizing attention to ads (Pieters, Warlop, and Wedel 2002; Pieters, Wedel, and Zhang 2007). A second logical step is to start examining the performance of ads under the very brief exposure conditions that are increasingly prevalent in practice. Surprisingly little research has done this (Pieters and Wedel 2012). The present research aimed to contribute to closing this knowledge gap.

Appendix A

Examples of Targets and Distracters in the Recognition Task: Study 1

Fragrance ads	*Target ad*	*Distracter ad*
Typical		
Mystery		
False front		

Appendix B

Model Description

The models estimated in study 1 and 2 are multilevel mixed-outcome models that contain an ad-level and a person-level component. We first describe the full model, and then explain how the models in study 1 and 2 are restricted versions of that model.

Ad-level model

Ad recall ($y_{i,j}^{a}$, where $i = 1, \ldots, N$ are participants and $j = 1, \ldots, J$ are ads), brand recall ($y_{i,j}^{b}$), and recognition ($y_{i,j}^{c}$) are binary variables. For these variables that follow a Bernoulli distribution with success probability $\pi_{i,j}^{k}$ ($k = \{a, b, c\}$) a probit link is used: $\text{probit}(\pi_{i,j}^{k}) = \eta_{i,j}^{k}$. Ad recall is composed of four categories: accurate image-product recall ($y_{i,j}^{d}$), inaccurate image-product recall ($y_{i,j}^{e}$), image-only recall ($y_{i,j}^{f}$), and product-only recall ($y_{i,j}^{g}$). For these variables, a multinomial logit link is specified: $\pi_{i,j,k} = \mathrm{e}^{\eta_{i,j}^{k}} / \sum_{k=1}^{K} \mathrm{e}^{\eta_{i,j}^{k}}$, where $\pi_{i,j}^{k}$ are the probabilities of the categories ($k = \{d, e, f, g\}$). The ad-level model for the underlying latent variables is:

$$\eta_{i,j}^{k} = X_j' \delta_i^{k} + M_{i,j} \beta_i^{k} \tag{1}$$

where k indicates the outcomes ($k = \{a, \ldots, g\}$). X_j is a (3 x 1) vector, which contains the intercept ($X_{j,1}$) and two orthogonal typicality contrasts ($X_{j,2}, X_{j,3}$). $M_{i,j}$ is the mediator category certainty.

The mediator category certainty ($M_{i,j}$) is ordered categorical. For this variable, an ordered probit model is specified, where $\pi_{i,j,c}^{h}$ are the probabilities of the response categories $c = 1, \ldots, C$. They are specified as: $\pi_{i,j,c}^{h} = \Phi(\gamma_c^{h} - \eta_{i,j}^{h}) - \Phi(\gamma_{c-1}^{h} - \eta_{i,j}^{h})$. The observed responses reflect an underlying continuous latent variable, which is discretized through C cut-points represented by the γ_c-parameters. The following cut points are fixed: $\gamma_0^{h} = -\infty$, $\gamma_1^{h} = 0$, $\gamma_C^{h} = \infty$ for identification (Congdon 2005). The ad-level model for the underlying latent variable is:

$$\eta_{i,j}^{h} = X_j' \delta_i^{h} \tag{2}$$

The δ_i^{k} and β_i^{k} parameters in (1) and (2) are individual-specific and account for heterogeneity between individuals in the effects of ad typicality and category certainty, respectively. Dependencies between outcome variables (e.g., ad and brand recall) are accounted for by allowing individual-specific constants to co-vary (e.g., $\rho^{a,b} = \text{cov}(\delta_{i,1}^{a}, \delta_{i,1}^{b})$).

Person-level Model

The person-level model specifies the means of the distributions of the individual-specific parameters δ_i^k and β_i^k as functions of the exposure duration (W):

$$\delta_i^k \sim \mathrm{N}(\bar{\delta}^{k\prime} W_i, \Sigma_\delta^k), \text{ and} \quad (3)$$
$$\beta_i^k \sim \mathrm{N}(\bar{\beta}^{k\prime} W_i, \Sigma_\beta^k),$$

for $k = \{a, \ldots, h\}$. W_i is a (2 x 1) vector, which contains a constant ($W_{i,1}$) and the exposure duration ($W_{i,2}$). The matrices Σ_δ^k and Σ_β^k are assumed to be diagonal. The hyper-parameters contained in the (2 x 3) matrices $\bar{\delta}^k$ capture the intercept and main effects of the typicality contrasts (X_1 and X_2), the main effect of the exposure duration (W), and the interactions (X_1W and X_2W). The hyper-parameters in the (2 x 1) vector β^k capture the main effect of category certainty (M) and its interaction with exposure duration (MW).

The models for study 1 and 2 are restricted versions of this full model. The model for study 1 has recall and recognition components, but no mediation. The model for study 2 has only recall components, and mediation by category certainty.

Direct and Indirect Effects (Moderated Mediation)

Posterior predictive distributions for all outcome variables are computed within the MCMC chain, which enabled us to produce figures 1 and 2. To obtain estimates of the direct effects of the predictors (X, W and XW) on the outcomes (M and Y) for study 2, the model is estimated with the β_i parameters in equation (1) (the path from category certainty to the recall outcomes) restricted to be zero. The simple effects (i.e., the effect of exposure duration for each ad type separately: the slopes) are also computed within the MCMC chain from the parameters for the main effect of exposure duration (W) and the interactions (X_1W and X_2W).

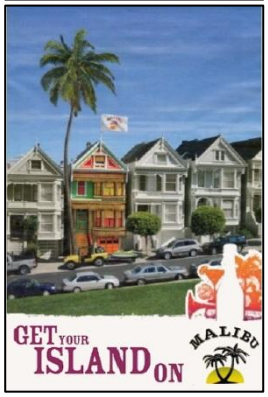
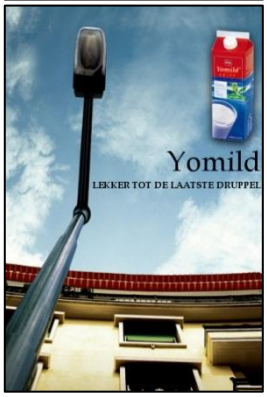
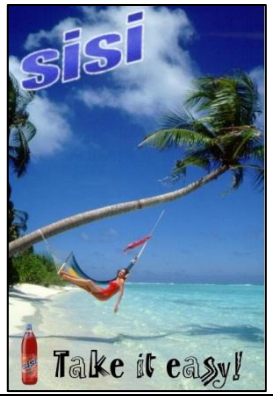
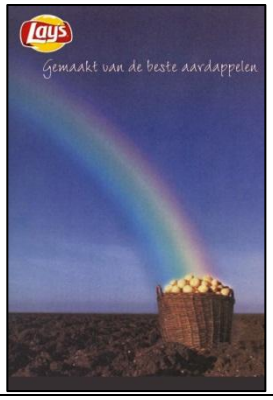
To obtain estimates of the indirect (moderated mediation) effects in study 2, the model is estimated with free β_i parameters. In order to appropriately estimate the indirect (moderated) effects, the model is estimated for each pair of ad types separately, but simultaneously. That is, X_j is a now a (2 x 1) vector, which contains the intercept ($X_{j,1}$) and a typicality contrast ($X_{j,2}$: typical = ½ *vs.* mystery = -½; false front = ½ *vs.* mystery = -½, or typical = ½ *vs.* false front = -½). To estimate the indirect effects, the products of the coefficients in question are computed for every draw in the MCMC chain (Zhang, Wedel, and Pieters 2009). Indirect effects are computed for each exposure duration condition separately, using the contrast codings of the variables and their corresponding parameters. In addition, to test whether the mediated effect of category certainty on recall depends on the exposure duration, the

moderated mediation effect is computed within the MCMC chain, by taking products of the proper path coefficients (see table 6 for more detail).

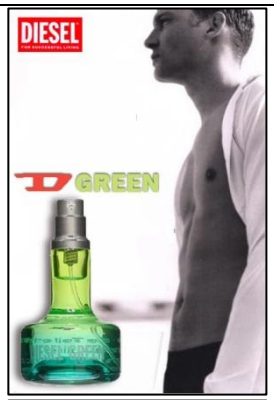
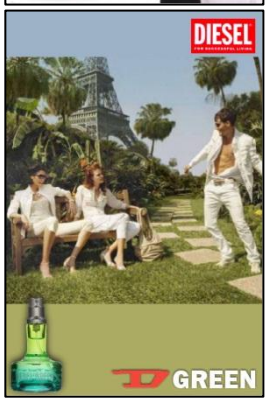
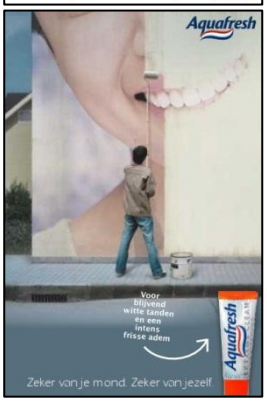
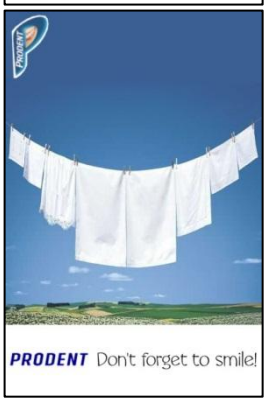
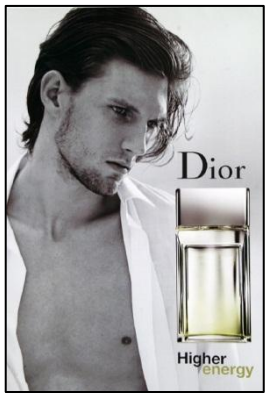
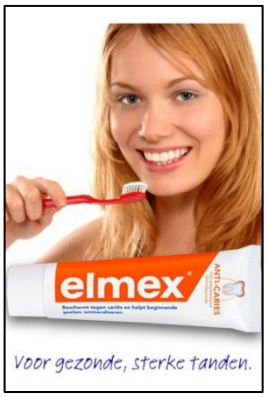
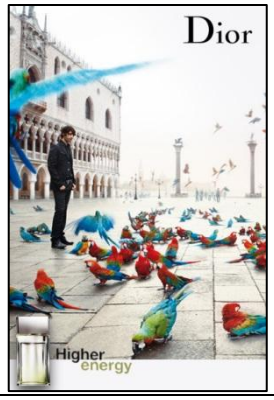
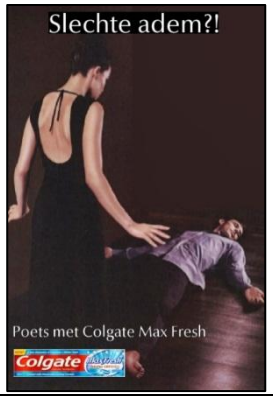
The models are estimated with MCMC, using WinBugs (Lunn et al. 2000). Results are reported for 50,000 draws from which 1 in 10 are retained, after a burn-in of 50,000. Convergence was checked by inspection of the iteration plots of the hyper-parameters and was achieved well before the end of the burn-in, in all cases.

Appendix C

Ads in Study 3

	Beverages		Food products	
Typical				
Mystery				
Typical				
Mystery				

Appendix C *(continued)*

	Fragrances		Tooth care	
Typical				
Mystery				
Typical				
Mystery				

Chapter 4

Duration-Frequency Effects

Two general strategies to maximize attention to ads are to increase the duration of exposure and to increase the frequency of exposure, yet research to date has mostly emphasized the latter. Three studies demonstrate the importance of the interplay between the two strategies. They show that comprehension processes determine attitudinal wear-in of ads (study 1 and 2), that memory processes determine attitudinal wear-out of ads (study 2 and 3), and the crucial role of exposure duration in these. Ads require minimum durations to be comprehended and to build distinctive memory traces, and even massed repeated exposures do not compensate for insufficient exposure durations. This has implications for attention and learning strategies and advertising practice.

Consumers are exposed to rising volumes of ads for which they have falling amounts of time. They rapidly page through magazines with print ads, surf the web with display and banner ads and move through cities and shopping malls with billboards and point-of-purchase material. Advertisers try to break through this clutter and maximize attention to their own ads in order to create positive impressions and build memory for the ad and brand. Two general strategies to accomplish this are to increase the *duration* of individual exposures to ads and to increase the *frequency* of exposure to the ads. The present research investigates how frequency effects crucially depend on the duration of exposure, and examines the interchangeability of the two strategies.

Even within a single session with a magazine, a website or in a mall, people have multiple opportunities to see the same ads at various exposure durations. What are the effects of these repeated exposures of varying duration? Marketing research about the joint influence that exposure duration and exposure frequency have on advertising effectiveness is remarkably rare, despite its relevance for marketing theory and managerial decision-making. Ad frequency studies have typically used multiple exposures with a single, fixed duration or with unknown durations (Anand and Sternthal 1990; Appleton-Knapp, Bjork, and Wickens 2005; Batra and Ray 1986; Belch 1982; Calder and Sternthal 1980; Campbell and Keller 2003; Cox and Cox 1988; Janiszewski, Noel, and Sawyer 2003; Malaviya 2007; Nordhielm 2002). Research about ad duration effects has mostly used single exposures (Aribarg, Pieters, and Wedel 2010; Wedel and Pieters 2000). Likewise, media planning theory and models have focused on the effects of reach, frequency and continuity of ad exposures but not yet on the duration of exposures (Danaher 2007; Rossiter and Percy 1997). In view of the increasing levels of competitive clutter, it is important to understand the joint effects of exposure duration and frequency on advertising processing and effectiveness.

The present research examines the interplay between duration and frequency of exposure on advertising wear-in and wear-out. Three controlled studies test the idea that attitudinal wear-in and wear-out of advertising depend on two learning processes – comprehension and memory – that influence attitudes in opposite ways. Specifically, the studies reveal the importance of comprehension processes in advertising wear-in, the influence of memory processes in advertising wear-out, and the critical role of duration vis-à-vis frequency in attaining high levels of comprehension and memory. They show that ads require minimum exposure

durations to be comprehended and retained in memory, and that increasing frequency does not compensate for insufficient durations.

Learning during Ad Exposure

The total time that consumers have to process information and learn from ads increases by repeatedly exposing them to the ads. Such information processing and learning reduces uncertainty about the identity of the ad and what it stands for, which is liked (Obermiller 1985; Lee 2001). As a result, attitudes improve across repeated exposures, up to a point where little new can be learned and boredom sets in (Cox and Cox 1988; Singh and Cole 1993; Stang 1975). Prolonging the duration of exposure also increases the total time to learn from ads, and thus should improve attitudes. If the total exposure time to ads indeed determines ad learning and attitudes, the exposure frequency and duration should have compensatory effects: one long exposure to an ad would be equivalent to two brief exposures of the same total duration.

We propose that the amount of learning that takes place across repetitions is crucially dependent on the duration of exposure, but very differently from what the "total time" hypothesis would suggest. In addition, we extend earlier research by showing the diverse roles of two learning processes in attitude formation, namely comprehension and memory (Kintsch 1994; Pechmann and Stewart 1989). Comprehension and memory have been used interchangeably as indicators of learning, sometimes potentially confounding the two processes by using memory measures to assess comprehension levels (Jacoby and Hoyer 1989; Rathneswar and Chaiken 1991; see Mick 1992). We demonstrate that comprehension and memory may influence attitudes in very diverse ways.

Exposure and Learning

All information in ads that appear in magazines, outdoor, catalogues or the Internet is usually available at once, but consumers need time to process it. Information processing and integration during ad exposure contribute to ad comprehension, which involves the reduction of uncertainty about the ad's object and source ("What is it?") and message ("What about it?"). Knowing what is advertised is a basic form of comprehension, that helps people to quickly determine whether the ad is relevant for current goal pursuit (Grunert 1996) and that is often a prerequisite for

understanding the ad's message (Fazio, Herr, and Powell 1992; Hoyer and MacInnis 2009).

During ad exposure, ad information rapidly accumulates from the first glance onwards. While trying to comprehend ads, newly processed information is integrated with information from previously attended locations in the ad and with prior knowledge in working memory (Hollingworth 2004; 2005; Rayner 1998). The end product of this cognitive processing is an abstract, coherent representation of the ad's meaning, which is then stored in long-term memory (Ericsson and Kintsch 1995). Once stored in long-term memory, the representation is relatively stable and resistant to interruptions (e.g., exposure to other ads). In fact, research has found that repeated exposures that are spaced in time may actually improve memory performance relative to massed or single exposures of the same total duration (Cepeda et al. 2006; Janiszewski, Noel, and Sawyer 2003). However, if the duration of exposure is too brief for abstract representations to be formed and transferred to long-term memory, the information will be irretrievably lost in a matter of seconds or when new input replaces the contents of working memory (Ericsson and Kintsch 1995; Potter 1999). Because of this impaired memory, the integration of information and formation of coherent, semantic ad representations across repeated brief exposures is much harder. Research on text comprehension illustrates this. Interruptions in the middle of the sentences of an unfamiliar text impede comprehension, whereas interruptions between sentences do not (McNamara and Kintsch 1996).

Thus, if the duration of exposure is too brief for abstract representations of the ad's meaning to be "complete", repeated exposures do not fully compensate for this. Ads require minimum *durations* for basic comprehension to take place and long-term memory traces to develop.

Learning and Attitude Formation

Subjective comprehension (i.e., the feeling of knowing the meaning of ads) influences attitudes depending on the valence of the specific thoughts that are generated during comprehension (Mick 1992). We argue that the comprehension process itself has an independent influence on attitude formation. People are meaning-makers. They generally dislike uncertainty and feel comfortable when things are predictable and consistent (Hogg 2007). The feeling of knowing what ads are for and about satisfies the need to comprehend (Kruglanski 1989). This is pleasurable in itself and should contribute to positive ad attitudes.

Whereas comprehension enhances attitudes, good memory may reduce attitudes. Since repeated ad exposure precludes the need to generate ad information

from memory, recognition is the relevant type of memory in this context. Upon repeated exposure, knowing with certainty that the *specific* ad is seen before – as opposed to merely having a *global* feeling of familiarity (Yonelinas 2002) – should depress attitudes. Specific recollection of previous ad exposure emphasizes the fact that the ad's content is already familiar, producing feelings of overexposure and satiation, particularly at high actual levels of exposure. In contrast, ads that fly under the radar of specific recognition should retain high levels of liking longer.

The perceptual fluency misattribution account proposed by Bornstein and D'Agostino (1992) also predicts a negative relation between recognition memory and attitudes. It posits that fluent processing as a result of repeated exposure is misattributed to liking if people are unaware of repetition as the source of the experienced fluency. If the stimulus is recognized as being seen before, attitudes are corrected downward. We believe that the critical factor is not *whether* or not ads are recognized, but the *specificity* with which they are recognized (Hansen and Wänke 2009). Whereas global feelings of familiarity ("This ad feels familiar") may enhance ad attitudes (potentially via a fluency misattribution process), we argue that high specific recognition ("I have seen this specific ad before") negatively affects attitudes.

To show the role of comprehension and recognition memory in attitudinal wear-in and wear-out, we compare ads that evoke different comprehension and recognition processes. From the range of potentially influential ad characteristics, we believe that ad typicality plays a special role because it directly affects both comprehension and recognition, and thereby attitude formation.

Ad Typicality Effects

Ad typicality is the degree to which an ad matches people's expectations of advertising in a particular product category. These expectations are formed based on similarities between ads within categories. Typical ads match people's expectations of what ads in the category normally look like. Atypical ads deviate from those expectations. They are dissimilar from other ads for the same product category, and thus unique.

Due to their similarity to other ads, typical ads can be almost instantly comprehended. A single glance is sufficient for basic comprehension of what is being advertised in typical ads, and this raises immediate attitudes towards them. Since typical ads are similar to other ads for the same product category, specific recognition memory is generally poor, even after a long exposure to them. Typical ads evoke

global feelings of familiarity, regardless of whether they were actually seen before or not (Coane et al. 2011). Ironically, their poor specific recognition memory may benefit typical ads. It should delay attitudinal wear-out after repeated exposures, even if the duration of exposure to them is long.

Due to their dissimilarity from other ads, comprehension of atypical ads takes more time. If the duration of exposure is sufficiently long to reduce uncertainty about the meaning of atypical ads, initially negative attitudes improve. However, if the duration of exposure is too brief for basic comprehension to occur, repeated exposures will not compensate for this because information integration across repeated brief exposures is difficult. Then, initially negative attitudes remain negative or drop even more if one's inability to comprehend the ad becomes frustrating. If the exposure duration is sufficiently long to process their unique features, atypical ads are recognized with high specificity and certainty at subsequent exposure. The feeling of knowing with certainty that the specific ad was seen before depresses attitudes towards atypical ads, particularly at higher exposure frequencies when the novelty of their initial exposure has faded.

In sum, we hypothesize that attitudes towards almost instantly comprehended, typical ads immediately wear-in, and that typical ads retain their relatively high levels of liking across repeated brief and long exposures due to high levels of comprehension and low levels of specific recognition, respectively. Atypical ads, in contrast, require longer exposures for comprehension and attitudes towards them to wear-in. If the duration of exposure is insufficiently long, initially negative attitudes remain relatively negative (or become even more negative) across repetitions due to a failure to comprehend. If the duration is sufficiently long, attitudes towards repeated atypical ads wear-out relatively rapidly due to good recognition memory for their specific content.

Support for the predictions would reveal the importance of comprehension and benefits of global familiarity (as opposed to specific recognition) in building and sustaining positive ad attitudes, respectively. It would show that ads require minimum durations to be comprehended and build up positive attitudes, with smaller durations for typical than for atypical ads, and that repeated exposures do not fully compensate for insufficient exposure durations.

Three studies test the predictions. Study 1 examines the interchangeability of frequency and duration in advertising wear-in. Study 2 extends to wear-out effects. It examines how frequency effects depend on the duration of exposure. Finally, since advertisers usually have more control regarding frequency than duration, study 3 examines frequency effects under self-controlled duration conditions.

Study 1

Study 1 examines duration-frequency effects on advertising wear-in. It tests the hypothesis that a single long exposure outperforms multiple brief exposures of the same total duration, if the brief exposures are insufficient to comprehend the ad.

Typical and atypical ads were presented at various combinations of exposure duration and frequency with the same total duration (e.g., 10 x 100 msec. versus 1 x 1 sec.; Hintzman, Summers, and Block 1975). Duration-frequency effects were tested under spaced exposure conditions, where repeated ads are separated by other ads, and under massed exposure conditions, where repeated ads are presented contiguously (Janiszewski, Noel, and Sawyer 2003). Massed exposure is the strongest test of the idea that ad exposure needs to be of sufficient duration for advertising wear-in to take place, and that increasing exposure frequency cannot fully compensate for insufficient durations. Ads across product categories and brands were used to be able to generalize.

Method

Participants and Design. Sixty-two paid undergraduate students (M_{age} = 21.00, *SD* = 2.27, 25 females) participated in a study with a 2 (Typicality) x 8 (Frequency-Duration) x 2 (Spacing) within-participants design.

The stimulus set comprised 32 ads (16 typical and 16 atypical ads) for six product categories (cars, beverages, food, cell phones, hair care, and shoes). It combined ads that were used in the studies in chapter 2 and 3 and new ads. Appendix A shows the ads. Participants saw either the typical or the atypical version of an ad (i.e., 8 typical and 8 atypical ads).

The eight frequency-duration conditions were each a combination of frequencies and durations, namely 10 x 100 msec., 10 x 200 msec., 8 x 250 msec., 4 x 500 msec., 4 x 1000 msec., 2 x 2000 msec., 2 x 4000 msec., and 1 x 8000 msec.. These exposure durations cover the minimum durations for single and multiple eye fixations (Wedel and Pieters 2008) and are chosen such that various frequency-duration combinations have the same total duration (Hintzman, Summers, and Block 1975). For instance, 10 x 100 msec., 5 x 200 msec., 4 x 250 msec., 2 x 500 msec., and 1 x 1000 msec., all result in 1000 msec. total exposure time, and 10 x 200 msec., 8 x 250 msec., 4 x 500 msec., 2 x 1000 msec., and 1 x 2000 msec., all result in 2000 msec. total exposure time. The selected exposure frequencies cover the range used in prior research (Campbell and Keller 2003; Pechmann and Stewart 1989). Appendix B provides details.

Half of the ads were presented massed, half were presented spaced, and massed and spaced exposures were presented in a mixed sequence. In the massed exposure condition, exposure to an ad was immediately followed by another exposure to the same ad only interspaced by measurement of the dependent variables. In the spaced exposure condition, two exposures of the same ad were separated by 9.5 other ads, on average (min. 6 and max. 15 ads)[11]. Ad typicality was counter-balanced, individual ads were rotated across frequency-duration conditions within the two spacing conditions, and there were two orders (from first to last and from last to first) to control for order effects, amounting to 32 between-participants ad sequences in total (i.e., 2 [Typicality rotation] x 8 [Ad rotation] x 2 [Order]). Ten filler ads (each presented only once) were added to make the ad sequence more heterogeneous. The total ad sequence comprised 92 ad exposures (i.e., a mix of 41 massed exposures (= 10 + 10 + 8 + 4 + 4 + 2 + 2 + 1), 41 spaced exposures, and 10 exposures to filler ads). Appendix B presents a sample ad sequence.

Stimulus Development. Ad typicality was manipulated by varying the ad pictorial while keeping all else in the ad constant (headline, brand name, size and position, lay-out, etc.), similar to the approach of Janiszewski and Meyvis (2001) in the context of logo complexity. Pretests confirmed the success of the typicality manipulation (see table A3 in appendix A). As intended, typical ads were considered more typical (M = 4.12), looked more like other ads in the same category (M = 4.03), and were easier to identify (M = 4.66) than atypical ads (M = 2.57, 2.08 and 2.46, respectively, on 5-point scales, all ps < .001). Atypical ads were judged to be more original (M = 3.61), creative (M = 3.55), and difficult to comprehend (M = 2.68), and were judged to require more time (M = 2.78) than typical ads (M = 2.62, 2.71, 1.77, and 1.82, respectively, all ps < .001). Typical and atypical ads did not differ on brand typicality, on visual appeal of the ad and the pictorial, on subjective and objective measures of visual complexity, or message persuasiveness (all Fs < 1), as intended. Brand familiarity of typical and atypical ads was the same by design.

Procedure and Measures. Participants read that they would see a number of ads, some being presented only very briefly (as "when flipping pages of a magazine for example") and others being presented longer, and that some ads would be presented multiple times as in practice ("think of, for example, the billboards that you pass on the way to work or school"). After each ad exposure, participants indicated on 0-to-100 visual analog scales their (1) product comprehension ("I know now what type of product is advertised" from *certainly not* to *certainly so*), (2) message

[11] Based on the average response time of participants of 5.77 sec (SD = 3.40) for a single ad exposure, average inter-presentation time of the same ad was 67.3 sec (min. 42.6 sec and max. 117.4 sec).

comprehension ("I understand the ad's message now" from *not at all* to *completely*), and (2) ad attitude ("Right now, my evaluation of the ad is..." from *negative* to *positive*). Thus, each participant provided in total 276 responses (92 ad exposures x 3 items). They engaged in a practice trial to warm up.

Analysis. Participants provided multiple responses to multiple ads that were presented at different durations and frequencies, spaced or massed. To accommodate this data structure and test the interchangeability of frequency and duration, we estimated a hierarchical linear model. Appendix C gives details about the model and estimation procedure.

Table 1 provides descriptive results, and table 2 and figure 1 summarize the results of the model estimation. Credible intervals in table 2 and figure 1 that do not overlap reflect significant differences at the 5% level (one-sided). Results are described based on the predicted means and their 5-95% credible intervals.

The lines in figure 1 connect the frequency-duration conditions with the same total time. The slopes of these lines are directly represented by the $\bar{\delta}_{X,\tau,2}$ parameters in the model (see appendix C), and provide a test of the total time hypothesis (the estimates are provided in table 2). Flat lines (i.e., zero slopes) indicate that outcomes are the same irrespective of the specific combination of duration and frequency, which is consistent with the total time hypothesis. Non-flat lines (i.e., significant slopes) indicate that outcomes are dependent on the specific composition of duration and frequency.

Results

Minimum Durations for Comprehension. Typical ads are immediately comprehended better than atypical ads are. A single exposure of 100 msec. is already sufficient to attain relatively high levels of product (M = 70, CI = 65, 74 on a 0-to-100 scale) and message comprehension (M = 50, CI = 44, 55). Product (M = 14, CI = 10, 18) and message comprehension (M = 15, CI = 11, 19) are much lower after a single 100-msec. exposure to atypical ads.

Product comprehension levels for typical ads steadily grow as exposure duration increases (represented by the dots in figure 1) from their high initial level to near ceiling levels after an exposure of 2 seconds (M = 96, CI = 93, 98). In contrast, product comprehension levels for atypical ads grow in jumps. They grow non-significantly from their low initial comprehension level of 14 after 100 msec. of exposure to a 23 (CI = 18, 27) after an exposure of 250 msec., and then rapidly jump

Table 1. *Descriptive Results: Study 1*

	Product comprehension								Message comprehension								Ad attitude							
Exp. duration:	100	200	250	500	1s	2s	4s	8s	100	200	250	500	1s	2s	4s	8s	100	200	250	500	1s	2s	4s	8s
Typical ads																								
Total time:																								
100	70								49								56							
200	76	73							60	52							63	52						
250			78								64								64					
500	81		79	87					70		67	75					64		65	63				
1000	81	87	86	90	88				67	74	77	75	77				60	61	68	65	68			
2000		89	88	94	93	95				76	77	85	84	90				58	66	68	73	73		
4000					93	98	96						88	93	88						71	76	72	
8000							95	99							89	95							73	75
Atypical ads																								
Total time:																								
100	14								15								30							
200	15	23							16	22							30	36						
250			23								21								39					
500	24		29	51					25		27	45					34		40	53				
1000	31	47	42	58	74				30	39	38	53	65				29	42	46	56	60			
2000		57	51	79	83	86				51	48	71	74	79				49	47	62	64	69		
4000					92	93	95						86	88	89						69	77	76	
8000							96	92							93	86							78	74

Note – Cell entries are mean scores for the total exposure time up to that point (duration x frequency). Shaded cells reflect single exposures.

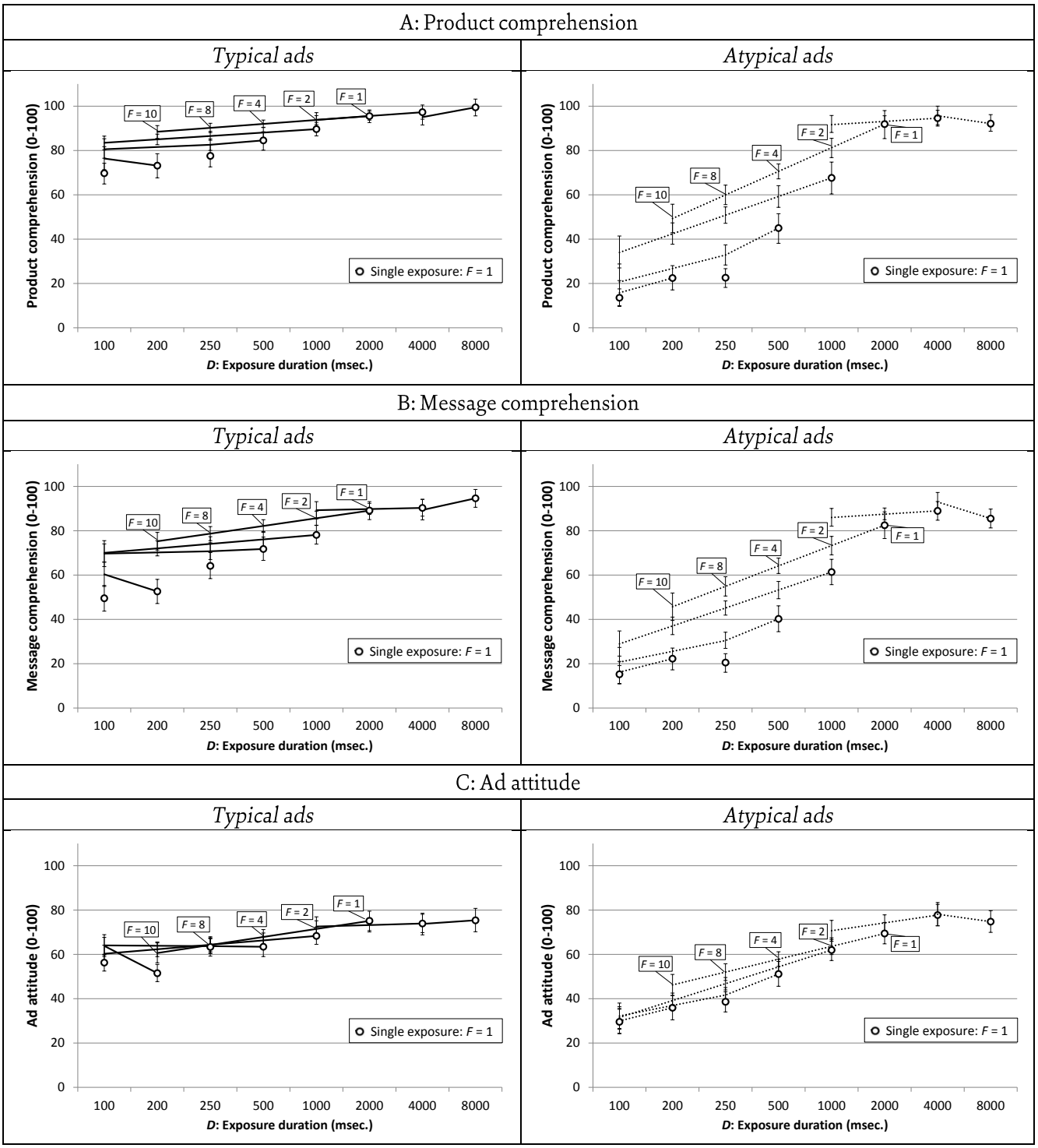
Table 2. *Duration-Frequency Effects: Study 1*

	Effect of Duration-Frequency (slope)																	
	Product comprehension						Message comprehension						Ad attitude					
	Typical			Atypical			Typical			Atypical			Typical			Atypical		
Total time (msec.)	5%	Estim.	95%	5%	Estim.	95%	5%	Estim.	95%	5%	Estim.	95%	5%	Estim.	95%	5%	Estim.	95%
200	-10	-3	4	-1	7	15	-16	-8	0	-1	6	12	-18	-12	-7	-2	6	15
500	-2	2	5	6	12	18	-3	1	5	5	10	15	-4	0	3	5	9	14
1000	0	2	3	5	8	11	1	2	3	6	8	10	1	2	3	6	8	10
2000	1	2	3	8	11	13	2	3	5	7	9	12	2	4	5	4	6	8
4000	-1	2	4	-2	1	4	-2	1	4	-2	1	5	-2	1	4	0	4	7
8000	0	4	10	-9	-4	2	-1	5	12	-13	-7	-1	-6	2	9	-10	-3	3
Average	0	1	3	4	6	8	-1	1	3	3	5	6	-2	-1	1	3	5	7

	Change in effect of Duration-Frequency due to Spacing																	
	Product comprehension						Message comprehension						Ad attitude					
	Typical			Atypical			Typical			Atypical			Typical			Atypical		
Total time (msec.)	5%	Estim.	95%	5%	Estim.	95%	5%	Estim.	95%	5%	Estim.	95%	5%	Estim.	95%	5%	Estim.	95%
200	-21	-10	4	-7	1	12	-26	-15	-4	-8	2	13	-31	-18	-7	-15	-5	6
500	-1	5	10	-6	0	7	-3	2	9	-8	-1	7	-7	-1	6	-11	-4	1
1000	-1	1	4	-3	1	5	-3	1	4	-6	-3	-1	-2	1	4	-8	-5	-2
2000	-2	1	3	-1	3	7	-1	1	4	-2	1	4	-2	1	3	0	2	5
4000	-5	0	5	-2	3	7	-2	4	9	-1	5	11	-1	5	10	-9	-4	3
8000	-11	-2	9	-15	-7	2	-9	2	10	-25	-14	-2	-14	-2	9	-14	-2	9

Note – Credible intervals (CIs) shown. CIs that do not overlap zero (each other) are deemed significant (different from each other). Boxes indicate differences between typical and atypical ads.

Figure 1. *Duration-Frequency Effects: Study 1*



to 45 (CI = 38, 51) after an exposure of 500 msec. (a significant 22 unit jump), then to 68 (CI = 60, 75) after an exposure of 1000 msec. (a significant 23 unit jump), and then to 92 (CI = 85, 98) after an exposure of 2000 msec. (a significant 24 unit jump). After exposure durations of 2000 msec. or more, typical and atypical ads attain the same levels of product comprehension. The same pattern of "high initial level and slow

growth" for typical ads and "low initial level and jumpy growth" for atypical ads is shown for message comprehension (figure 1, middle). Together, this provides strong evidence that ads that differ in typicality require different exposure durations to be comprehended. A single glance is already sufficient to comprehend much of typical ads. Comprehension of atypical ads requires more time, and improves with particularly large jumps between 250 and 2000 msec. of exposure.

Total Time Hypothesis. The lines in figure 1 connect the conditions with the same total exposure time. For example, 10 exposures of 200 msec., 8 exposures of 250 msec., 4 exposures of 500 msec., 2 exposures of 1000 msec. and a single exposure of 2000 msec. all result in a total exposure time of 2000 msec. (this example is accentuated in the graphs). Table 2 provides the estimates of the slopes of the total time lines (top) and their dependency on the spacing of exposures (bottom). Non-significant slopes provide support for the total time hypothesis, and significant slopes indicate that the outcomes depend on the specific composition of duration and frequency.

Since additional exposure time contributes relatively little to the immediately high levels of comprehension of typical ads, outcomes after single, long exposures are very similar to those after multiple, brief exposures of the same total duration. That is, the slopes of the total time lines in figure 1 are not significantly different from zero or very small (table 2, top).

In contrast, the slopes of the total time lines for atypical ads are positive and significant, and larger than for typical ads, but only if the total exposure time is sufficient (i.e., 500 msec. or longer) and the duration of the brief exposures insufficient for ad comprehension, as predicted. This demonstrates that single, long exposures generally outperform multiple, brief exposures of the same total duration. For example, whereas the level of product comprehension is 92 (CI = 85, 98) after a single 2000 msec. exposure, it is only 49 (CI = 43, 56) after 10 exposures of 200 msec. and only 60 (CI = 56, 64) after 8 exposures of 250 msec. However, if the total exposure time is insufficiently long for atypical ads to be comprehended, comprehension levels do not differ between the various duration-frequency combinations (e.g., 2 x 100 msec. versus 1 x 200 msec.). If the duration of the brief exposures is already sufficiently long for comprehension to occur, additional exposure time contributes little after the first exposure and comprehension levels also do not depend on the specific combination of duration and frequency (e.g., 1 x 4000 msec. versus 4 x 1000 msec. or 2 x 2000 msec.).[12] Thus, in support of our predictions,

[12] The only exception is the 8000 msec. total time condition, where a single ad exposure of 8000 msec. (M = 85, CI = 81, 90) produces somewhat lower levels of message comprehension than two

these results reveal that a single sufficiently long exposure outperforms multiple insufficiently long exposures of the same total duration.

Attitudes. The pattern of results for ad attitudes is quite similar to that of comprehension, although the differences are somewhat smaller. After a single 100-msec. exposure, attitudes are more positive for typical ads (M = 56, CI = 52, 60, figure 1) than for atypical ads (M = 30, CI = 24, 35). When exposure durations become longer, attitudes towards typical ads steadily increase with non-significant steps from a level of 56 to a level of 75 (CI = 71, 79) after 2 sec. of exposure, and remain constant thereafter. Attitudes towards atypical ads, in contrast, remain at their low initial level up to 250 msec. of exposure, then improve significantly to a comprehension level of 69 (CI = 65, 74) after an exposure of 2 sec., and then remain at the same level again.

The results of the total time hypothesis test for attitudes are largely the same as for comprehension. That is, the slopes of the total time lines are generally non-significant or small-but-significant for typical ads.[13] This reveals that ad attitudes after single, long exposures are very similar to those after multiple, brief exposures. In contrast, the slopes are positive and significant for atypical ads, except for very brief (200 msec.) and very long (8000 msec.) total time conditions, as before. Thus, attitudes towards atypical ads are more positive after a single exposure of sufficient duration than after multiple exposures of insufficient duration.

Effects of Spacing. Recall that spacing of exposures was systematically manipulated (massed versus spaced) to test the idea that even massed repeated exposures do not compensate for insufficient exposure durations. The slopes of the total time lines are largely unaffected by spacing (table 2, bottom). Particularly, spacing generally does not affect duration-frequency effects at the critical, intermediate total time conditions, where the total time is sufficiently long and the duration of the brief exposures insufficiently long for ads to be comprehended.[14] It

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exposures of 4000 msec. (M = 93, CI = 88, 97). Because this duration-frequency effect is qualified by a duration-frequency x spacing interaction (see table 2, bottom), we return to this finding in the discussion of spacing effects.

[13] The only exception is the 200 msec. total time condition, where ad attitudes are lower after a single ad exposure of 200 msec. (M = 51, CI = 48, 55) than after two exposures of 100 msec. (M = 64, CI = 60, 68). Because this duration-frequency effect is qualified by a duration-frequency x spacing interaction (see table 2, bottom), we return to this finding in the discussion of spacing effects.

[14] Spacing influences duration-frequency effects on message comprehension at the briefest (for typical ads) and longest (for atypical ads) total time conditions. In both cases, the slope of the total time line is not significantly different from zero in the massed exposure condition, but negative and significant in the spaced exposure condition. Consistent with the spacing effect in the literature (Janiszewski, Noel, and Sawyer 2003), it shows that two *sufficiently* long exposures produce higher

only affects message comprehension and attitudes for atypical ads in the 1000 msec. condition. Surprisingly, the slopes of the total time lines are even somewhat steeper in the massed (M = 10, CI = 7, 12 and M = 10, CI = 8, 13) than in the spaced exposure condition (M = 7, CI = 4, 9 and M = 5, CI = 3, 7 for message comprehension and attitudes, respectively). Atypical ads are comprehended better after a single 1-second exposure (M = 67, CI = 60, 74) than after multiple, insufficiently long, massed exposures of the same total duration (M = 28, CI = 21, 35 after 10 x 100 msec.; M = 38, CI = 33, 43 after 5 x 200 msec.; M = 47, CI = 43, 52 after 4 x 250 msec.), and attitudes reflect comprehension levels. This demonstrates that even if the exposures are in close temporal proximity, with no other ads presented in between, repeated exposures do not fully compensate for insufficient exposure durations.

Effects of Comprehension. To reveal the influence of comprehension on attitudes, a follow-up model was estimated. Product and message comprehension were added as predictors in the ad attitude model. The rest of the model remained the same. As expected, product and message comprehension predicted attitudes significantly, and there were no differences between typical and atypical ads in this (product comprehension effect for typical ads: .10, CI = .04, .16, and for atypical ads: .20, CI = .12, .28; message comprehension effect for typical ads: .46, CI = .41, .52, and for atypical ads: .43, CI = .36, .51, across all total time conditions).

Together, these results show that ads require minimum durations to be comprehended and build up positive attitudes, with smaller durations for typical than for atypical ads, and that repeated (even massed) exposures do not fully compensate for insufficient exposure durations. This reveals the importance of exposure duration in advertising wear-in, and the role that comprehension plays in driving immediate attitudes towards ads.

Study 2

Study 1 focused on duration-frequency effects on advertising wear-in. It compared outcomes after single, long exposures with outcomes after multiple, brief exposures, keeping total exposure time constant. Study 2 examines the effect of frequency, keeping exposure duration fixed at 100 msec. (brief exposures) or 10 sec. (long exposures). It tests the hypotheses that attitudes towards atypical ads do not

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levels of comprehension than a single long exposure of the same total duration, if the exposures are spaced rather than massed.

wear-in at all if brief exposures are repeated, and that they wear-out faster than typical ads if long exposures are repeated.

Study 2 extends study 1 in three ways. In addition to advertising wear-in, it examines potential wear-out effects due to overexposure. The maximum total exposure time to an ad is seventy seconds, as opposed to only eight seconds in study 1. Second, it probes deeper into the learning that takes place during ad exposures by examining effects on both comprehension and recognition memory. Third, it aims to rule out that the findings of study 1 were due to demand and mere measurement effects. Participants in study 1 rated each ad after each exposure, which may stimulate tendencies to report attitude changes when they do not exist (Sawyer 1975). Therefore, study 2 separates ad exposures and response measurement. In addition, it uses a new ad set to establish the generalizability of the findings.

Method

Participants and Design. One hundred and ninety-four paid students (M_{age} = 21.14, *SD* = 4.18, 90 females) were randomly assigned to a condition of a 2 (Typicality) x 4 (Exposure frequency) x 2 (Exposure duration) mixed design, with typicality and exposure frequency as within-participants factors, and exposure duration as between-participants factor. Exposure frequency levels were 1, 2, 4 and 7. Exposure durations were 100 msec. (brief) and 10 seconds (long), which is, respectively, well before and after comprehension of atypical ads as study 1 established.

The experiment had an exposure phase and a test phase. During the exposure phase, participant saw six (out of eight) target ads, and six filler ads to make the ad sequence more heterogeneous. Two ads (one typical, one atypical) were presented once, two ads three times, two ads six times, and the six filler ads each only once, amounting to 26 exposures. Exposures were spaced such that there were at least two other ads in between two presentations of the same target ad. Ads were rotated between-participants, such that each target ad was presented at each frequency level.

Stimulus Development. Eight new ads (four typical and four atypical) for food products, beverages, cars, and personal care products were designed for this and the next study, and pretested as before (table A3 in appendix A). As intended, typical ads were considered more typical (*M* = 4.75), looked more like other ads in the same category (*M* = 4.49), and were easier to identify (*M* = 4.61) than atypical ads (*M* = 1.96, 1.95, and 2.28, respectively, on 5-point scales, *p*s < .01). Atypical ads, in turn, were judged to be more original (*M* = 4.34), more creative (*M* = 4.16), more difficult to comprehend (*M* = 3.04), and to require more time (*M* = 3.49) than typical ads (*M* =

1.89, 2.03, 1.86, and 1.67, respectively, *p*s < .05). Typical and atypical ads did not differ in brand typicality, brand familiarity, ad and pictorial visual appeal, subjective and objective measures of visual complexity, or message persuasiveness (*F*s < 1).

For the test phase of the study, distracter ads were created by slightly changing four of the target ads (two typical, two atypical). New but very similar pictorials replaced the pictorials in these ads. A pretest (N = 18) confirmed that ads and distracters were equally similar for typical (M = 6.28) and atypical ads (M = 6.39, F < 1). Target and distracter ads are in appendix A.

Procedure and Measures. Participants were informed that a set of ads would be presented, followed by questions about the ads. After the 26 ad exposures, the filler ads were presented again with their brand elements covered to disguise the actual purpose of the study, and participants were asked to indicate for which brand the ad was.

Then, after about 10 minutes of participating in another, unrelated study, participants took part in the second phase of the study. They were informed that they were about to view ten ads; that some of these ads were "old" and others were "new" and that questions would be asked about them. Next, ten ads were presented, either for 100 msec. or 10 seconds (depending on the between-participants condition). Each participant saw four out of the eight target ads, four distracter ads for the remaining target ads, and two filler ads. Each participant saw a different combination of target, distracter, and filler ads. After each ad, product comprehension ("I know what type of product is advertised in this ad" on a 7-point scale from (1) *certainly not* to (7) *certainly so*), graded recognition memory ("I have seen exactly this ad earlier today" on a 4-point scale with labels (1) *certainly not*, (2) *I think not*, (3) *I think so*, and (4) *certainly so*), and ad attitude (To me, this ad is …" on a 7-point scale from (1) *negative* to (7) *positive*) were measured, in that order. Because of the similar findings for product and message comprehension in study 1 (correlation = .83, p < .001), only product comprehension was assessed. Presentation of typical and atypical ads was mixed, and there were two ad sequences (from first to last, and from last to first) to control for order effects. The two filler ads were presented first and last in the sequence.

Analysis. Recognition responses for targets and distracters were combined into a measure of specific recognition memory. Specific recognition memory is reflected in accurate recognition of target ads and correct rejection of distracter ads. Therefore, recognition responses for distracter ads were reverse-scored, while recognition responses for target ads remained unchanged. Higher mean scores on this

recognition measure reflect better discrimination between presented and non-presented ads (i.e., "hits plus correct rejections").

Typicality (*X*) and frequency (*F*) were manipulated within-participants, and duration (*D*) was manipulated between-participants, resulting in a multi-level data structure, and there are multiple ordered categorical outcome variables (product comprehension, ad recognition, and attitude). Therefore, a hierarchical ordered probit model was estimated. Typicality and duration were contrast-coded (atypical = -½, typical = ½, and brief = -½, long = ½), and frequency coded linearly (1 exposure = -1½, 2 exposures = -½, 4 exposures = ½, 7 exposures = 1½). Linear and squared terms of frequency captured potential nonlinear effects. Appendix C provides model details.

Table 3 provides descriptive results, and table 4 and figure 2 summarize the results of the model estimation. Credible intervals in figure 2 that do not overlap reflect significant differences at the 5% level (one-sided). Estimates of simple and indirect effects (see appendix C) are provided in the text with their 2.5-97.5% credible intervals.

Results

Attitudes. The results in table 4 and figure 2 reveal a marginally significant three-way interaction between ad typicality, exposure duration (squared), and exposure frequency. Attitudes are significantly more positive for typical than for atypical ads after a brief exposure, and typical ads sustain this advantage across repeated exposures. The initially more negative attitudes towards atypical ads do not improve across repetitions (effect of frequency: .07, CI = -.11, .24), which supports the prediction and corroborates the findings of study 1.

After exposures of long durations, ad repetition has very different attitude effects. As predicted, when atypical ads are repeated, attitudes towards them first improve and then drop (curvilinear effect of frequency: -.26, CI = -.46, -.07). Attitudes towards typical ads, in contrast, show the opposite effect (curvilinear effect of frequency: .16, CI = .01, .33). As a consequence, attitudes towards typical and atypical ads do not significantly differ at relatively low frequencies of one, two, and four exposures. However, they are more negative for atypical ads (M = 4.20) than for typical ads (M = 4.88) after seven long exposures. This supports the hypothesis that atypical ads wear-out more quickly when long exposures are repeated.

We predicted differences in attitudes after brief and long exposures to be due to differences in comprehension and recognition memory, respectively.

Comprehension. The results in table 4 and figure 2 reveal the predicted interaction effect of ad typicality and exposure duration on product comprehension.

Again, product comprehension after 100 msec. is much higher for typical (M = 4.69) than for atypical ads (M = 1.73). Repeated brief exposures improve product comprehension of typical and atypical ads, but the improvement is relatively small. Even after seven exposures, product comprehension is still well below the mid-point of the scale for atypical ads (M = 3.05), which confirms the finding of study 1 that multiple brief exposures to atypical ads do not produce a complete accumulation of comprehension. A single 10-sec. exposure, in contrast, raises product comprehension to ceiling levels, for both typical and atypical ads.

Table 3. *Descriptive Results: Study 2*

	Product comprehension (7-point)							
	Brief (100 msec.)				Long (10 sec.)			
Frequency:	1	2	4	7	1	2	4	7
Typical	4.69 (2.19)	5.41 (1.76)	5.27 (1.68)	5.81 (1.63)	6.73 (.63)	6.74 (.70)	6.76 (.55)	6.77 (.69)
Atypical	1.73 (1.25)	2.50 (1.68)	2.33 (1.87)	3.05 (2.41)	5.89 (1.86)	6.50 (1.20)	6.64 (.68)	6.94 (.31)

	Specific recognition memory (4-point)							
	Brief (100 msec.)				Long (10 sec.)			
Frequency to target:	0	1	3	6	0	1	3	6
Typical	-	2.51 (1.22)	2.63 (1.27)	2.80 (1.31)	-	2.95 (1.22)	3.16 (1.21)	3.22 (1.16)
Atypical	-	2.93 (1.17)	2.64 (1.33)	2.67 (1.40)	-	3.43 (1.10)	3.31 (1.15)	3.78 (.68)

	Ad attitude (7-point)							
	Brief (100 msec.)				Long (10 sec.)			
Frequency:	1	2	4	7	1	2	4	7
Typical	4.91 (1.29)	4.66 (1.22)	4.86 (1.37)	5.04 (1.32)	4.84 (1.10)	4.51 (1.42)	4.50 (1.37)	4.88 (1.39)
Atypical	3.91 (1.00)	4.32 (1.12)	4.09 (1.10)	4.23 (1.48)	4.18 (1.59)	4.80 (1.55)	4.64 (1.28)	4.20 (1.63)

Note – Means with standard deviations between parentheses.

To test the mediating effect of product comprehension on attitudes, moderated by the duration of exposure, we conducted a moderated mediation analysis. Appendix C describes the model. Product comprehension mediates between ad typicality and attitudes (indirect effect = .22, CI = .12, .33), and the size of the mediated effect is moderated by the exposure duration (moderated indirect effect: -.21, CI = -.43, -.01). As predicted, the mediated effect is stronger in the brief duration

condition (indirect effect = .31, CI = .13, .48) than in the long duration condition (indirect effect = .09, CI = 0, .22).

Table 4. *Summary of Model Estimation: Study 2*

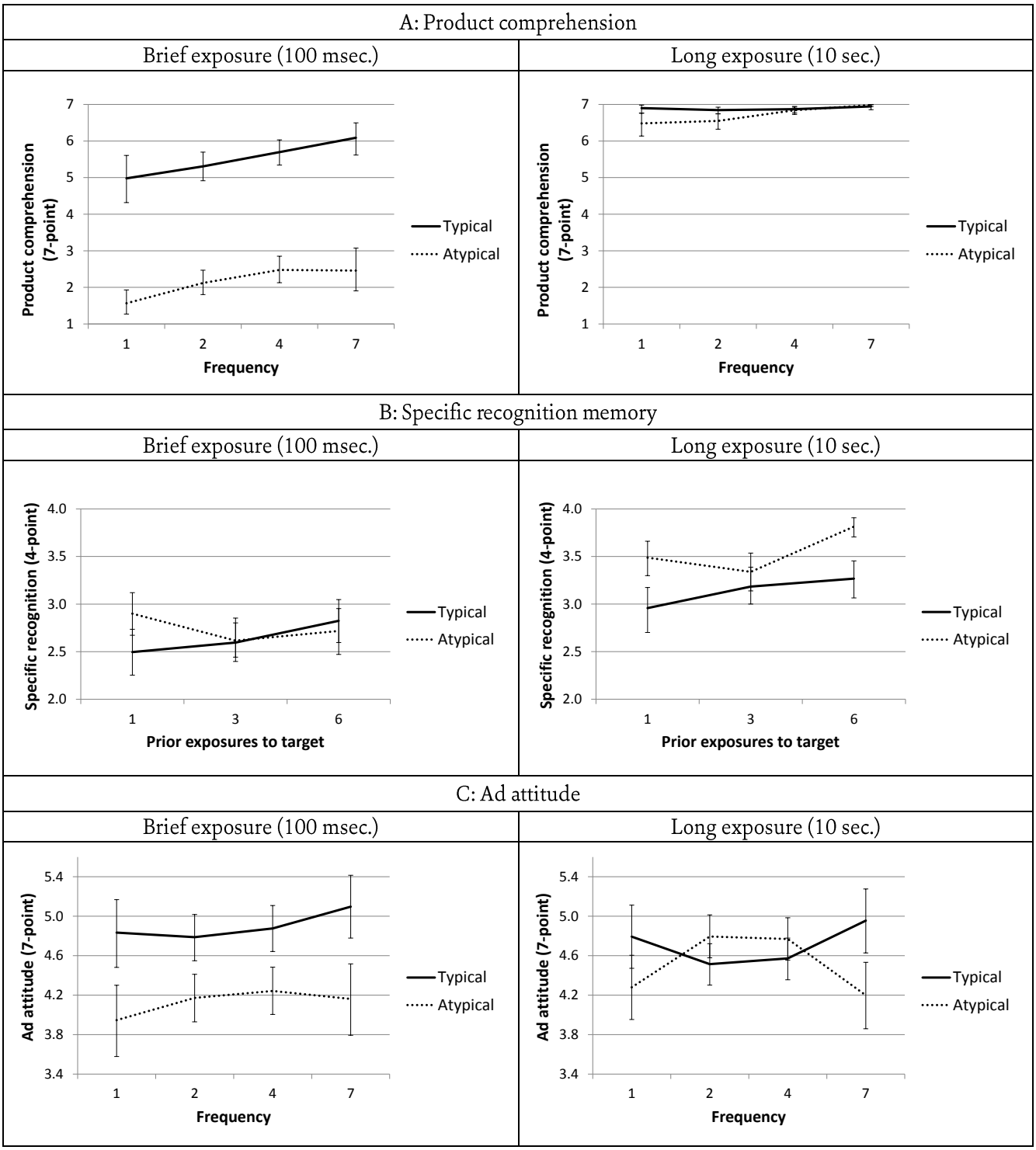
	Product comprehension		Specific recognition memory		Ad attitude	
Predictors	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*
Intercept	**2.46**	**.18**	**.74**	**.07**	**2.39**	**.18**
X: Typical *vs.* Atypical	**1.16**	**.15**	-.10	.13	.11	.14
F: Frequency	**.32**	**.07**	**.13**	**.05**	.05	.04
F^2:	.09	.07	**.17**	**.08**	-.02	.05
D: Duration	**2.43**	**.23**	**.63**	**.12**	.15	.15
XF	**-.26**	**.13**	.04	.09	.05	.09
XF^2	.06	.13	**-.34**	**.17**	**.28**	**.11**
XD	**-1.55**	**.39**	-.15	.23	**-.92**	**.23**
FD	.10	.12	*.20*	*.11*	-.06	.09
F^2D	**.30**	**.14**	.10	.16	-.05	.09
XFD	**-.52**	**.23**	**-.38**	**.19**	.06	.18
XF^2D	*-.25*	.26	*-.45*	*.29*	*.29*	*.15*

Note – Bold (italic) estimates indicate that the 95% (90%) credible interval (CI) does not cover zero. Heterogeneity *SD*s are not shown.

Recognition Memory. Specific recognition memory is influenced by a three-way interaction between ad typicality, exposure frequency, and duration (table 4). After brief exposures, specific recognition memory is relatively poor, and not different between typical and atypical ads at any frequency (figure 2). Findings for long exposures are very different. After one long exposure, specific recognition memory is significantly higher for atypical (M = 3.43) than for typical ads (M = 2.95). Specific recognition of atypical ads does not significantly change between one and three exposures and then improves to ceiling levels after six exposures (M = 3.78). In contrast, it remains relatively difficult to discriminate typical ads from similar distracters, revealing relatively poor specific recognition of these ads, even after six long exposures (M = 3.22).[15]

[15] Because distracter ads in the recognition task were also distracters during attitude measurement, it was not possible to relate false recognition of *distracters* (which reveals the specificity of recognition) to attitudes of *target ads*. Study 3 provides more insight into the influence of recognition memory on attitudes.

Figure 2. *Duration-Frequency Effects: Study 2*



Note – Exposure frequencies differ for specific tasks.

These findings support our hypotheses. First, they show the importance of comprehension in attitudinal wear-in: atypical ads do not wear-in at all when insufficiently long exposures are repeated. Second, they reveal that atypical ads wear-out more quickly when long exposures are repeated. The findings for recognition

memory suggest that this is due to the fact that atypical ads are recognized with high specificity and certainty, particularly when long exposures to them are repeated.

Study 3

In practice, advertisers often have more control over the frequency than over the duration of exposure. Therefore, study 3 examines frequency effects under self-controlled (i.e., controlled by the viewer) duration conditions. It tries to rule out that the faster wear-out of atypical ads in study 2 was due to the fixed durations of exposures. Long exposure durations were fixed to be 10 seconds, which is longer than usually required for ad comprehension, as study 1 revealed. In practice, people can often cope with repetition by reducing the exposure duration to ads (Pechmann and Stewart 1992; Pieters, Rosbergen, and Wedel 1999). This may prevent or postpone attitudinal wear-out. If the "spare time" during fixed long exposures in study 2 felt more aversive in case of atypical ads, this might have reduced attitudes towards them. Then, attitudinal wear-out of atypical ads would be slower when people could control exposure duration themselves. Study 3 tests this.

Study 3 also examines the effect of specific recognition memory on attitudinal wear-out in more detail. Due to the design of study 2, it was not possible to directly relate recognition memory to attitudes. The recognition findings suggested that the higher memorability of atypical ads accounted for their faster wear-out under repeated exposure. Study 3 tests this idea.

Method

Participants, Design, and Stimuli. One hundred and thirty paid undergraduate students (M_{age} = 21.27, *SD* = 4.15, 66 females) participated in the study that had a 2 (Typicality: typical *vs.* atypical) x 4 (Exposure frequency: 1, 2, 4, 7) within-participants design. There were three phases: (1) exposure, (2) attitude, and (3) recognition. Target and distracter ads were the same as in study 2.

Procedure and Measures. The set-up of the exposure phase was as in study 2, except that participants could now control the exposure duration themselves, by pressing the space bar of the personal computer on which the study was run. As before, each participant was exposed to two ads (one typical, one atypical) once, two ads three times, two ads six times, and six filler ads, amounting to 26 exposures.

In the attitude phase, one filler ad (first) and all eight target ads were presented once more. Participants could again view each of the ads as long as they

wanted. After exposure, ad attitude ("To me, this ad is…") on a scale from (1) *negative* to (7) *positive*, and brand attitude were assessed ("Due to this ad, my evaluation of the brand has …") on a scale anchored by (1) *become more negative* and (7) *become more positive*, with (4) *not changed* as the middle response. Typical and atypical ads were mixed, and there were two ad sequences (from first to last, and from last to first) to control for order effects. After the attitude phase, participants engaged in unrelated other studies for about 15 minutes.

Then, in the recognition phase, four out of the eight target ads, and four distracters for the remaining four target ads, as well as two new filler ads were shown. Participants indicated for each ad, whether they had seen the exact same ad before or not (*yes*/*no*). Filler ads were always in position 1 and 6. Typical and atypical target ads and distracters were mixed and presented in two sequences between-subjects (from first to last, and from last to first) to control for order effects.

In contrast to study 2, participants first evaluated all presented target ads, and then provided recognition responses for targets and distracters. This set-up allows us to relate recognition responses for distracter ads to evaluations of the corresponding target ads within-participants.

Table 5. *Descriptive Results: Study 3*

	Cumulative self-controlled exposure duration (sec.)				Specific recognition memory (prop.)			
Frequency:	1	2	4	7	1	2	4	7
Typical	4.49 (2.78)	6.23 (3.04)	10.15 (4.75)	14.73 (6.43)	.62 (.49)	.63 (.48)	.72 (.45)	.75 (.44)
Atypical	6.17 (3.38)	8.39 (5.78)	11.60 (7.61)	16.19 (6.21)	.74 (.44)	.76 (.43)	.86 (.35)	.85 (.36)

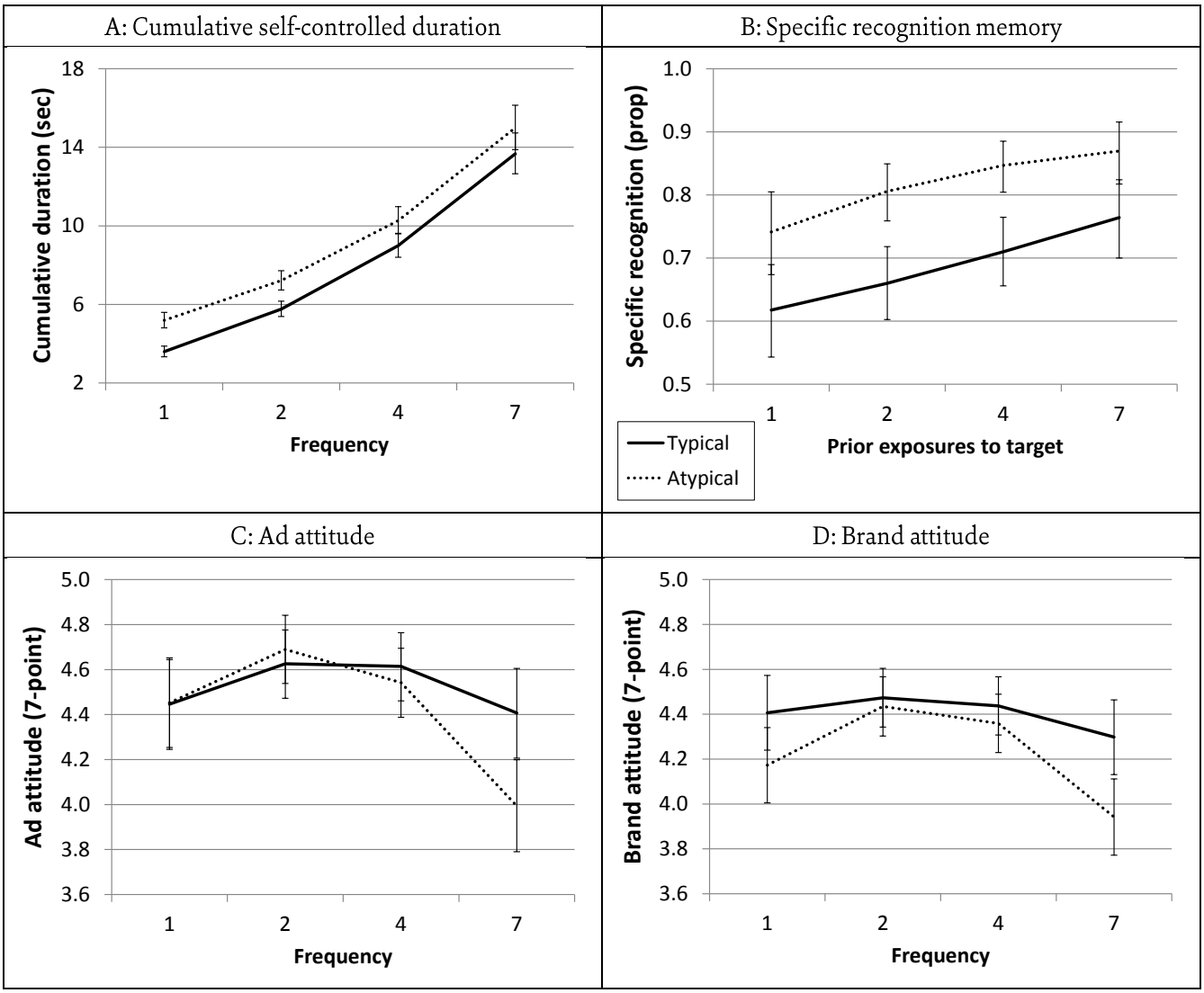
	Attitude (7-point)							
	Ad				Brand			
Frequency:	1	2	4	7	1	2	4	7
Typical	4.47 (1.34)	4.62 (1.22)	4.63 (1.28)	4.40 (1.34)	4.39 (1.14)	4.49 (1.21)	4.42 (1.13)	4.31 (1.13)
Atypical	4.42 (1.53)	4.75 (1.48)	4.44 (1.51)	4.00 (1.58)	4.18 (1.19)	4.40 (1.22)	4.38 (1.30)	3.94 (1.30)

Note – Means with standard deviations between parentheses.

Analysis. Independent variables are typicality (X) and frequency (F and F^2). Dependent variables are cumulative exposure duration (which is log-normal), recognition memory (which is binary), and ad and brand attitudes (which are ordered

categorical). To obtain a measure of specific recognition memory as in study 2, recognition responses were scored "1" for targets that were correctly recognized (i.e., a "hit") and for distracters that were correctly rejected (i.e., a "correct rejection"), and "0" otherwise. A random-intercept mixed-outcome model was estimated to test the effect of typicality and frequency on the dependent variables. Appendix C provides details about the model. Table 5 provides the descriptive results. Table 6 and figure 3 summarize the model estimation results.

Figure 3. *Duration-Frequency Effects: Study 3*



Results

Ad attitudes are influenced by frequency, frequency-squared, and the predicted interaction between typicality and frequency (which is marginally significant, table 6). As predicted, and consistent with study 2, attitudes towards atypical ads drop significantly with increasing exposure frequency, in particular later

on (simple effect of frequency: -.11, CI = -.19, -.03; frequency-squared: -.14, CI = -.24, -.05). Attitudes towards typical ads, in contrast, do not depend on the frequency of exposure (simple effect of frequency: -.01, CI = -.09, .07; frequency-squared: -.07, CI = -.16, .02). As a consequence, attitudes towards typical and atypical ads do not significantly differ at relatively low frequencies of one, two and four exposures, but they are more negative for atypical ads (M = 4.00) than for typical ads (M = 4.40) after seven long exposures. Brand attitudes show a similar pattern of results (table 6 and figure 3). This reveals that even under self-controlled exposure conditions, atypical ads wear-out more rapidly than typical ads.

Table 6. *Summary of Model Estimation: Study 3*

	Cumulative exposure duration		Specific recognition memory		Attitude			
					Ad		Brand	
Predictors	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*	Estimate	*SD*
Constant	**2.06**	**.04**	**.72**	**.08**	**2.09**	**.10**	**2.25**	**.12**
X: Typical *vs.* Atypical	**-.17**	**.04**	**-.47**	**.14**	-.02	.10	.03	.10
F: Frequency	**.40**	**.01**	**.15**	**.04**	**-.06**	**.03**	*-.05*	*.03*
F^2: Frequency-squared	-.00	.01	-.01	.05	**-.11**	**.03**	**-.10**	**.03**
XF	**.09**	**.02**	-.02	.08	*.10*	*.06*	.04	.06
XF^2	-.03	.02	.04	.09	.07	.06	*.11*	*.06*

Note – Bold (italic) estimates indicate that the 95% (90%) credible interval (CI) does not cover zero. Heterogeneity *SD*s are not shown.

We predicted the drop in attitudes towards atypical ads at high exposure frequencies to be due to high recognition memory rather than to a greater amount of time spent on the ad. Specific recognition memory is influenced by the main effects of typicality and frequency (table 6 and figure 3). It is significantly higher for atypical (M = .80) than for typical ads (M = .68), as predicted, and increases over repeated exposures (from M = .68 after a single exposure to M = .80 after seven exposures). Self-controlled cumulative duration (i.e., total time) is influenced by typicality, frequency, and their interaction (table 6 and figure 3). Significantly more time is spent on atypical ads (M = 6.17 sec.) than on typical ads (M = 4.49 sec.), but only at the first exposure, after which attention to ads quickly drops. After the first exposure, exposure duration to typical and atypical ads is essentially the same. This is reflected in the parallel cumulative duration lines in figure 3 (top-left).

A follow-up model estimated the effect of specific recognition memory and its interactive effects with frequency and frequency-squared on ad attitudes for typical

and atypical ads separately, while controlling for the cumulative self-controlled exposure duration and all other effects as per appendix C. The results revealed main effects of frequency-squared (estimate = .71, CI = .13, 1.29) and recognition (estimate = .87, CI = .29, 1.48) for atypical ads, which were qualified by the predicted frequency-squared x recognition interaction (estimate = -.92, CI = -1.60, -.25). As the frequency of exposure increased, the effect of specific recognition memory on ad attitudes towards atypical ads first became more positive (from .16 to .87) and then more negative (to -.25). None of the other factors had a significant influence.

General Discussion

Increasing duration and increasing frequency are two general strategies to increase attention to ads. The present research examined joint effects of duration and frequency on attitudes, and revealed the very diverse roles of two learning processes – comprehension and memory – in attitude formation. Specifically, the studies demonstrate the importance of comprehension in attitudinal wear-in (study 1 and 2) and the drawbacks of specific recognition memory in attitudinal wear-out (study 2 and 3). Furthermore, they show the important role of exposure duration relative to frequency in attaining high levels of comprehension and memory. Ads require minimum durations to be comprehended and to build distinctive memory traces, and even massed repeated exposures do not compensate for insufficient exposure durations.

Minimum durations depend on the typicality of the ad for the product category. Whereas typical ads are almost instantly comprehended, atypical ads require longer durations. As a consequence, attitudinal wear-in takes place after a single brief exposure to typical ads and after a single longer exposure to atypical ads, but hardly at all after repeated brief exposures to atypical ads (study 1 and 2). Typical and atypical ads both require longer exposure durations to develop distinctive memory traces. However, since typical ads are by definition less distinctive, specific recognition memory remains relatively poor for these ads. This has surprising benefits for typical ads: attitudinal wear-out is less strong for typical than for atypical ads after long (study 2) and self-controlled (study 3) repeated exposures.

Our theory and results go against the widely shared (but untested) idea that atypical ads delay attitudinal wear-out (Sasser and Koslow 2008; Smith and Yang 2004). In fact, presenting atypical ads at high frequencies may hurt ad effectiveness. Consistent with prior research (Pieters, Warlop, and Wedel 2002) and the popularity

of atypicality as a creative strategy, atypical ads retained attention longer at first exposure and were more memorable than typical ads. Atypical ads did not continue to draw more attention than typical ads after the first exposure, but still left more distinctive memory traces, leading those ads to be readily and specifically recognized at subsequent exposures. Ironically however, this specific recognition memory reduced attitudes towards the ad and the advertised brand at high exposure frequencies, implying a trade-off between the two.

Attitudes towards atypical ads are most positive when exposure duration is long and frequency is low (after two exposures in the present studies). Even at these optimal conditions, atypical ads did not outperform typical ads however. Attitudes towards typical ads were immediately high and virtually unaffected by increases in the frequency or duration of exposure. Only study 1 revealed some small-but-significant improvements in attitudes across repeated and prolonged exposures. In studies 2 and 3, attitudes towards typical ads were essentially the same at all duration-frequency combinations. This shows the benefits of being typical, and the perhaps surprising ability of typical ads to retain their high levels of liking, even after repeated long exposures.

Relationship to Other Research

Our predictions and findings diverge from two-factor (Berlyne 1970) and related attitude theories, which would predict the opposite. Two-factor theory proposes that attitude formation is function of two opposing factors: positive habituation (a reduction of uncertainty or conflict) and tedium. At low exposure frequencies, positive habituation predominates, which contributes to more positive attitudes. At higher exposure frequencies, tedium starts to predominate, which depresses attitudes. Because initial uncertainty is low for typical ads and high for atypical ads, the theory would predict more rapid completion of habituation and quicker set-in of tedium for typical ads.

Habituation is a passive form of learning that involves becoming familiar with or getting used to the stimulus. Any increase in exposure time (through prolongation or repetition) leads to further familiarization with the stimulus (Berlyne 1970). Feelings of familiarity increase attitudes because they signal certainty and predictability, even if one is aware of their source (Lee 2001). In contrast, comprehension is a more active form of learning, that may require cognitive integration of information. Comprehension does not monotonically increase with increased exposure time. Rather, the present research has demonstrated that it takes place in sudden jumps ("aha" effects; Topolinski and Reber 2010), and occurs either

almost instantly (for typical ads) or later on during prolonged exposure (for atypical ads). Whether habituation or comprehension determines attitude formation depends on the type of stimuli to be learned. Prior research has typically used stimuli that varied in perceptual complexity (e.g., Cox and Cox 1988), showing that more rapid habituation and tedium for perceptually simple than for perceptually complex ("cluttered") stimuli. The current research, in contrast, shows very different effects for ads varying in "cognitive" complexity, that is, in how difficult they are to comprehend.

Why do typical ads actually retain their high initial levels of liking? The fluency misattribution account (Bornstein and D'Agostino 1992) suggests that the fluency that results from repeated exposures to typical ads is misattributed to liking because people are unaware of the actual source of fluency (as evidenced by the relatively poor recognition memory of typical ads). It predicts a negative relationship between specific recognition and attitudes: if an ad is recognized as being seen before, attitudes are corrected downward. Contrary to this prediction, Study 3 demonstrated a positive (albeit non-significant) influence of specific recognition on attitudes for typical ads (estimate = .31, CI = -.17, .84). This is more consistent with an uncertainty reduction account, which predicts positive effects of recognition on attitudes (Berlyne 1970; Bornstein 1989; Lee 2001). Thus, our findings point to a curvilinear relationship between specific recognition and attitudes: at low levels of specific recognition, increases in recognition memory may improve attitudes, but at high levels of specific recognition, increases in recognition memory depress attitudes. Future research may directly test this.

Concluding Remarks

This study has examined short-term effects of duration and frequency under controlled conditions. Short-term effects are important to understand from a theoretical point of view. They are practically relevant as well, as consumers have increasing possibilities to respond directly to ads, by sending in coupons, clicking, or grabbing. Yet, the findings cannot readily be generalized to long-term effects in practice. Repeated long exposure to atypical ads may promote attitudinal wear-out in the short-run but may boost attitudes in the long-run, as an expression of a sleeper effect (Pechmann and Stewart 1989). Follow-up research may test when this occurs.

Consumers are exposed to rising volumes of ads that compete for their limited attention. They cannot deeply process the content of all ads they are exposed to. The majority of ads receives a brief look at best. Advertisers may be tempted to compensate for falling exposure durations by increasing exposure frequency. The present research demonstrates that exposure frequency and duration are not

generally interchangeable. Our findings re-appraise the effects of exposure duration vis-à-vis exposure frequency. They demonstrate that one ad exposure may be enough, and that more may not or be too much.

Appendix A

Ads in the Studies

Table A1. *Ads in Study 1*

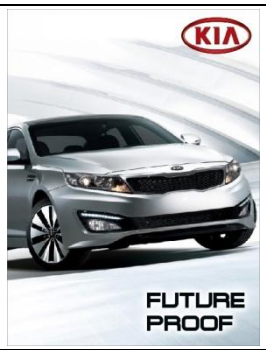
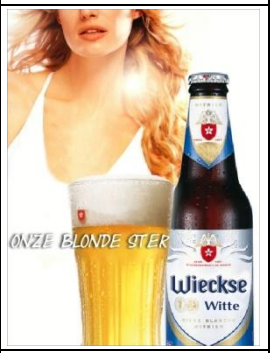
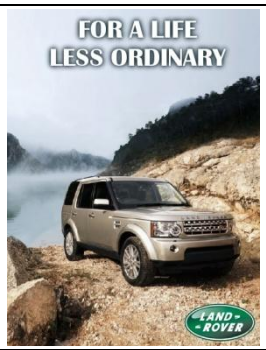
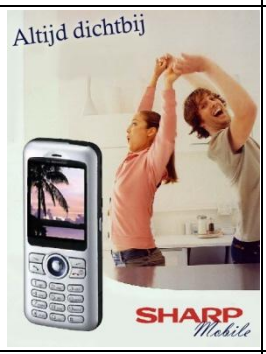
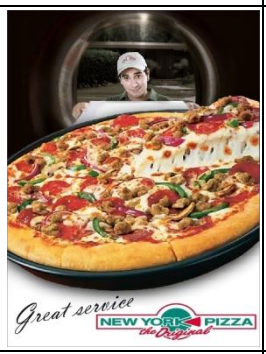
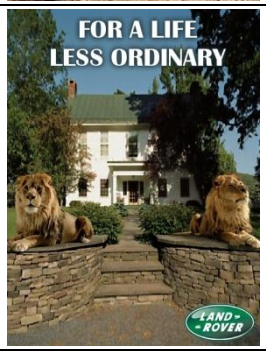
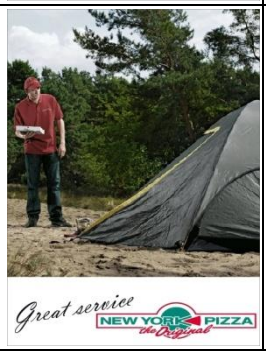
	Cars	Cell phones	Food products	Beverages
Typical				
Atypical				
	Cars	Cell phones	Food	Hair care
Typical				
Atypical				

Table A1 *(continued).*

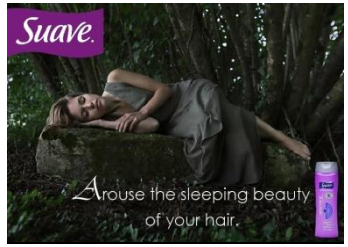
	Beverages	Beverages	Food products	Hair care
Typical				
Atypical				
	Beverages	Cars	Food	Shoes
Typical				
Atypical				

Table A2. Ads in Studies 2 and 3

		Beverages	Cars	Food products	Personal care
Typical	Target				
	Distracter				
Atypical	Target				
	Distracter				

Table A3. *Characteristics of ads in the studies*

		Typical		Atypical				
	Study	Mean	(*SD*)	Mean	(*SD*)	*F*	*p*	N_{id}
Typicality								
Typical	S1	4.12	(.60)	2.57	(.68)	46.67	<.001	8
	S2	4.75	(.24)	1.96	(.61)	71.08	<.001	20
Looks like other ads	S1	4.03	(.32)	2.08	(.55)	153.32	<.001	12
	S2	4.49	(.58)	1.95	(.61)	36.59	<.010	20
Easy to identify	S1	4.66	(.16)	2.46	(.78)	121.13	<.001	12
	S2	4.61	(.18)	2.28	(.88)	27.05	<.010	20
Creativity								
Original	S1	2.62	(.48)	3.61	(.52)	31.60	<.001	12
	S2	1.89	(.57)	4.34	(.23)	62.83	<.001	19
Creative	S1	2.71	(.63)	3.55	(.49)	17.95	<.001	8
	S2	2.03	(.44)	4.16	(.26)	70.55	<.001	19
Comprehensibility								
Difficult to comprehend	S1	1.77	(.38)	2.68	(.51)	33.19	<.001	12
	S2	1.86	(.31)	3.04	(.64)	11.06	<.050	19
Requires time	S1	1.82	(.41)	2.78	(.54)	31.69	<.001	12
	S2	1.67	(.16)	3.49	(.60)	34.54	<.010	19
Other								
Brand familiarity	S1	-	-	-	-	-	-	-
	S2	4.59	(.40)	4.38	(.35)	.60	.470	17
Brand typicality	S1	.04	(.13)	.02	(.06)	.35	.559	6
	S2	.21	(.23)	.09	(.18)	.75	.419	14
Visual appeal (ad)	S1	3.36	(.41)	3.24	(.43)	.67	.419	12
	S2	3.42	(.53)	3.38	(.56)	.01	.917	18
Visual appeal (pictorial)	S1	3.18	(.41)	3.15	(.50)	.05	.823	16
	S2	3.49	(.47)	3.33	(.64)	.15	.715	18
Complexity (objective)	S1	300	(76)	296	(51)	.03	.863	-
	S2	413	(32)	419	(71)	.03	.873	-
Complexity (subjective)	S1	3.15	(.61)	3.37	(.81)	.71	.405	9
	S2	3.01	(.70)	3.08	(.25)	.04	.858	18
Message persuasiveness	S1	3.03	(.37)	3.15	(.43)	.83	.370	8
	S2	3.26	(.63)	2.96	(.32)	.77	.414	17

Note – Typicality: "This ad is … for this kind of product", 5-point, from (1) *atypical* to (5) *typical*, "This ad looks like other ads for this kind of product" and "I instantly know what kind of product is advertised", both on 5-point scales, from (1) *certainly not* to (5) *certainly so*. Creativity: "This ad is …", 5-point, from (1) *not original* to (5) *original*, and "This ad delivers the message in a creative way" from (1) *certainly not* to (5) *certainly so*. Comprehensibility: "This ad is … to comprehend", 5-point, from (1) *easy* to (5) *difficult*, and "It takes some time before I comprehend this ad", 5-point, from (1) *certainly not* to (5) *certainly so*. Brand familiarity: 5-point, from (1) *unfamiliar* to (5) *familiar*. Note that brand familiarity is constant by design in study 1. Brand typicality: percentage of accurately identified brands in a "masked identification test", where ads are presented with their brand

elements covered. Message persuasiveness: "I find this ad's message …", 5-point, from (1) *not persuasive* to (5) *very persuasive*. Visual appeal (ad): "This ad is …", 5-point, from (1) *ugly* from (5) *beautiful*. Visual appeal (pictorial): "The picture in this ad is …", 5-point, from (1) *ugly* to (5) *beautiful*. Complexity (objective): file-size of the JPEG-compressed ad image. Complexity (subjective): "In this ad, there is …", 5-point, from (1) *little to see* to (5) *much to see*. Ad ratings come from various participant samples, ranging between 12 and 20 participants per ad and item (N_{id}). Data are analyzed at the ad-level (N_{ad} = 32 in study 1, and 8 in study 2).

Appendix B

Exposure Conditions: Study 1

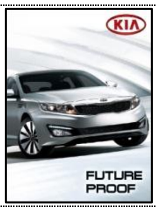
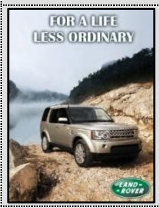
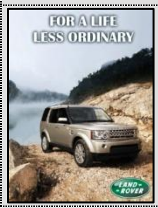
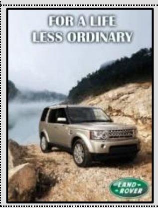
Table B1. *Exposure Conditions in Study 1*

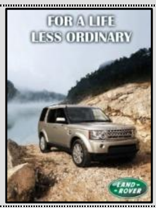
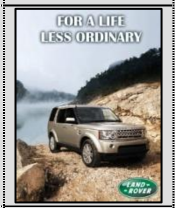
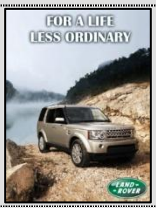
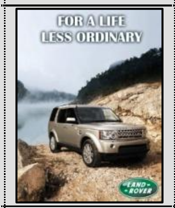
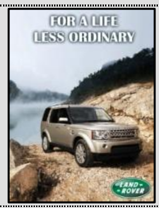
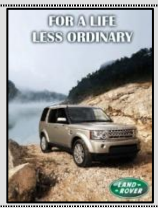
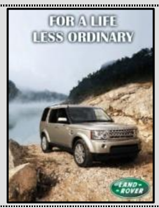
Total exposure time (msec.)	Duration (*D*) of a single exposure (msec.)							
	100	200	250	500	1000	2000	4000	8000
100	*F* = 1							
200	2	1						
250			1					
300	3							
400	4	2						
500	5		2	1				
600	6	3						
700	7							
750			3					
800	8	4						
900	9							
1000	10	5	4	2	1			
1200		6						
1250			5					
1400		7						
1500			6	3				
1600		8						
1750			7					
1800		9						
2000		10	8	4	2	1		
3000					3			
4000					4	2	1	
8000							2	1

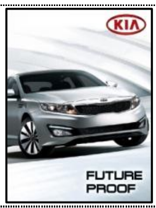
Note – Table B1 presents the combinations of exposure frequencies and durations in study 1. Columns contain the duration of a single exposure to an ad (*D* = 100, 200, 250, 500, 1000, 2000, 4000, 8000 msec.). Table cells contain the exposure frequency (*F* = 1,..., 10). Columns and cells combine to produce the total exposure duration for each ad (100,..., 8000 msec.), which are in the rows. The same total duration can come from several combinations of *D* and *F* (= row-wise comparisons of cells). The same exposure duration (*D*) can result in different total exposure durations (= column-wise comparison of cells).

Table B2. *Example of an Ad Sequence in Study 1*

Exposure nr.	1	2	3	4	5	6
						
Ad	T1	A2	A12	A12	A12	A12
Duration (msec.)	100	200	500	500	500	500

Exposure nr.	7	8	9	10	11	12	13
							
Ad	T3	A2	T1	T5	T9	T9	T9
Duration (msec.)	250	200	100	1000	100	100	100

Exposure nr.	14	15	16	17	18	19	20
							
Ad	T9	T9	T9	T9	T9	T9	T9
Duration (msec.)	100	100	100	100	100	100	100

Exposure nr.	21	22	23	24	25	26	
							Etc. to 92 exposures
Ad	A2	T3	T5	T1	A6	T7	
Duration (msec.)	200	250	1000	100	2000	4000	

Note – Table B2 gives an example of an ad sequence in study 1. T = typical, A = atypical. Different numbers represent different ads. Shaded areas reflect massed exposures, and non-shaded areas reflect spaced exposures. Ad typicality was counter-balanced (e.g., T1 – A2 – A12 – etc. *vs.* A1 – T2 – T12 – etc.), ads were rotated across frequency-duration conditions (e.g., T1 – A2 – A12 – etc. *vs.* T2 – A3 – A13 – etc.), and there were two orders (from first to last and from last to first), amounting to 32 ad sequences in total (i.e., 2 [Typicality rotation] x 8 [Ad rotation] x 2 [Order]).

Appendix C

Model Description

Study 1

Let $i = 1, \dots, N$ participants, $j = 1, \dots, K$ ads, and $X = 1, 2$ typicality types. The model compares various frequency-duration combinations with the same total time (τ) for each of eight total time conditions (i.e., the eight total time conditions that include a single long exposure, see table B1). The dependent variables are product comprehension ($y_{i,j}^{a}$), message comprehension ($y_{i,j}^{b}$) and ad attitude ($y_{i,j}^{c}$). The model is:

$$y_{i,j,X,\tau}^{k} = W_{i,j}' \delta_{i,X,\tau}^{k} + \varepsilon_{i,j,X,\tau}^{k} \quad (1)$$

where $\varepsilon_{i,j,X,\tau}^{k} \sim \mathrm{N}\left(0, (\sigma_{y}^{k})^{2}\right)$ for $k = \{a, b, c\}$. $W_{i,j}$ is a (4 x 1) vector, which contains the intercept, and the within-participants variables duration ($D_{i,j}$), spacing (S_j) and their interaction ($D_{i,j}S_j$). The individual-specific parameters $\delta_{i,X,\tau}^{k}$ are assumed to follow a normal distribution across the participant sample: $\delta_{i,X,\tau}^{k} \sim \mathrm{N}\left(\bar{\delta}_{X,\tau}^{k}, \Sigma_{\delta_{X,\tau}}^{k}\right)$. The matrices $\Sigma_{\cdot}$ are assumed to be diagonal. Spacing (S_j) is contrast-coded: spaced = ½, massed = -½. Duration ($D_{i,j}$) is a linear contrast from low exposure duration (high frequency) to high exposure duration (low frequency). Because total time is constant here, $D_{i,j}$ automatically captures frequencies.

Study 2 and 3

Ad-level Model. Manipulated variables are ad typicality (X), exposure frequency (F), and exposure duration (D, only in study 2). Typicality and frequency are manipulated within-participants, and duration between-participants, resulting in a multi-level data structure. Dependent variables are comprehension, recognition, attitudes, and cumulative exposure duration (only in study 3). For all dependent variables, the ad-level model is:

$$\eta_{i,j}^{k} = W_{i,j}' \delta^{k} \quad (2)$$

where $i = 1, \dots, N$ are participants, $j = 1, \dots, J$ are ads, and k indicates the outcomes ($k = \{a, b, c\}$: comprehension, specific recognition and ad attitudes in study 2, and $k = \{c, d, e, f\}$: ad attitudes, brand attitudes, specific recognition, and cumulative exposure duration in study 3). $W_{i,j}$ is a (6 x 1) vector, which contains the intercept and the within-participants factors: typicality (X_j), linear and squared terms of frequency ($F_{i,j}$ and $F_{i,j}^{2}$) to capture potential nonlinear effects, and their interactions ($X_j F_{i,j}$ and $X_j F_{i,j}^{2}$). Typicality is contrast-coded (atypical = -½, typical = ½) and frequency coded linearly (1 exposure = -1½, 2 exposures = -½, 4 exposures = ½, 7 exposures = 1½).

For comprehension ($y_{i,j}^{a}$), recognition ($y_{i,j}^{b}$, in study 2), and ad ($y_{i,j}^{c}$) and brand ($y_{i,j}^{d}$, in study 3) attitudes (which are all ordered categorical), ordered probit specifications are used. The probabilities $\pi_{i,j,c}^{k}$ $(k = \{a, b, c, d\})$ of the response categories $c = 1, \ldots, C$ are specified as: $\pi_{i,j,c}^{k} = \Phi(\gamma_{c}^{k} - \eta_{i,j}^{k}) - \Phi(\gamma_{c-1}^{k} - \eta_{i,j}^{k})$. The observed responses reflect an underlying continuous latent variable, which is discretized through C cut points represented by the γ_{c}^{k}-parameters. The following cut points are fixed: $\gamma_{0}^{k} = -\infty, \gamma_{1}^{k} = 0, \gamma_{C}^{k} = \infty$ for identification (Congdon 2005). For recognition ($y_{i,j}^{e}$, in study 3), which is binary, a probit link is used: $\text{probit}(\pi_{i,j}^{e}) = \eta_{i,j}^{e}$. For cumulative exposure duration, which is log-normal: $\log(y_{i,j}^{f}) = \eta_{i,j}^{f} + \varepsilon_{i,j}$, where $\varepsilon_{i,j} \sim \text{N}(0, \sigma_{y}^{2})$.

Person-level Model. In study 2, all δ^{k} parameters are individual-specific. The means of the distributions of δ_{i}^{k} are parameterized as functions of the between-participants factor exposure duration:

$$\delta_{i}^{k} \sim \text{N}(\bar{\delta}^{k\prime} B_{i}, \Sigma_{\delta}^{k}). \tag{3}$$

The matrices Σ. are assumed to be diagonal. B_i is a (2 x 1) vector which contains the intercept and the exposure duration (D_i). Duration is contrast-coded (brief = -½, long = ½). The hyper-parameters contained in the (2 x 6) matrices $\bar{\delta}^{k}$ capture the intercept, main effects of typicality (X), frequency (F and F^2) and duration (D), and their interactions (XF, XF^2, XD, XFD, and XF^2D).

In study 3, only intercepts are individual-specific ($\delta_{i,1}^{k}$). They are assumed to follow a normal distribution across the participant sample: $\delta_{i,1}^{k} \sim \text{N}(\bar{\delta}_{1}^{k}, (\sigma_{\delta}^{k})^{2})$.

Linear and curvilinear simple effects (i.e., the effect of frequency and frequency-squared for each ad type and/or duration condition separately) are computed within the MCMC chain.

Study 2 and 3: Indirect Effects

Study 2. To test the mediating effect of product comprehension on attitudes, and the moderating role of exposure duration, product comprehension ($y_{i,j}^{a}$) is added as a predictor in the ad-level model for ad attitudes:

$$\eta_{i,j}^{c} = W_{j}^{\prime} \delta_{i}^{c} + y_{i,j}^{a} \beta_{i} \tag{4}$$

The β_i parameters are individual-specific, taking into account heterogeneity between individuals in the influence of product comprehension. Their mean is parameterized as a function of the exposure duration: $\beta_{i} \sim \text{N}(\bar{\beta}^{\prime} B_{i}, \Sigma_{\beta})$, with B_i containing an intercept and the exposure duration (D_i), as before. The rest of the model remains the same.

To obtain estimates of the mediation and moderated mediation effects, products of the coefficients in question are computed for every draw in the MCMC chain. In addition, mediation effects are determined for each exposure duration condition separately (but estimated simultaneously), as in chapter 2 and 3.

Study 3. A new model tests the effect of specific recognition memory on ad attitudes towards typical and atypical ads, and the moderating influence of exposure frequency[16]. An ordered probit specification is used for ad attitudes ($y^c_{i,j}$), as before. The model for the underlying latent variable is:

$$\eta^c_{i,j,X} = W'_{i,j}\delta^c_X + M'_{i,j}\beta_X + \log(y^f_{i,j})\kappa_X \quad (5)$$

$X = 1, 2$ denotes the typicality types. $W_{i,j}$ is a (3 x 1) vector which contains the intercept and linear and squared terms of frequency. $M_{i,j}$ is a (3 x 1) vector which contains the potential mediator recognition memory ($y^e_{i,j}$), and its interaction with the linear and squared terms of frequency. $y^f_{i,j}$ is the cumulative self-controlled exposure duration. The parameters in the (3 x 1) vector β_X capture the effect of recognition on ad attitudes ($\beta_{X,1}$) and its interaction with frequency ($\beta_{X,2}$ and $\beta_{X,3}$ for linear and curvilinear effects, respectively) for typical and atypical ads. Intercepts are individual-specific ($\delta^c_{i,X,1}$), and assumed to follow a normal distribution across the participant sample: $\delta^c_{i,X,1} \sim \mathrm{N}(\bar{\delta}^c_{X,1}, (\sigma^c_{\delta_X})^2)$.

Results are reported for 30,000 draws from which 1 in 10 are retained, after a burn-in of 20,000. Convergence was checked by inspection of the iteration plots of the hyper-parameters and was achieved well before the end of the burn-in, in all cases.

[16] Since ad exposure frequencies differ for attitude (1, 2, 4, 7) and recognition (2, 3, 5, 8) tasks, data were restructured such that recognition after 2 exposures predicted attitudes after 2 exposures, average recognition after 3 and 5 exposures predicted attitudes after 4 exposures, and recognition after 8 exposures predicted attitudes after 7 exposures. We admit that this restructuring of the data is not ideal, but acceptable given that our predictions are about the effects at low versus high frequencies (we do not predict large differences in effects between 7 and 8 exposures, for example). Despite this limitation of the experimental design, we believe the analysis provides important initial insights into the relationship between recognition and attitudes.

Chapter 5

General Discussion

Much is known about advertising processing and effectiveness after long exposures of 5 to 30 seconds or more and insights are accumulating on the effects of subliminal exposures up to about 30 msec. Little is known about what happens in between such extremely short and extremely long exposure durations. This is surprising given that in practice ad processing seems to proceed at a time scale that falls exactly in between these two extremes, from a single glance up to a couple of seconds. The present dissertation aimed to contribute to closing this knowledge gap by examining advertising processing and effectiveness after very short and longer exposures. Our findings reveal the decisive role of the exposure duration in the effectiveness of print ads with different creative designs even within the short span of a few seconds, which has important implications for advertising theory and practice.

Chapter 2 and 3 investigated the influence of exposure duration on attitudes and memory for typical, mystery, and false fronts ads. Chapter 4 moved beyond effects of single exposures to ads, and examined the joint effects of exposure frequency and exposure duration. Table 1 provides a summary of the key findings.

Chapter 2 demonstrated that after a brief glance, attitudes for typical and false front ads were more positive than attitudes for mystery ads. When exposure duration became longer, attitudes remained high for typical ads, but sharply improved for mystery ads and deteriorated for false front ads. The findings revealed that these effects were due to feelings of knowing the product category that is being advertised, independent of the accuracy of knowing.

In Chapter 3, we examined the role of exposure duration in memory for typical and atypical ads, and observed very different effects for recall and recognition memory. Recall memory was higher for typical ads and false front ads than for mystery ads after brief exposures, but equally high for the three ad types after longer exposures. Specific recognition memory was poor for all ad types after brief exposures, but higher for mystery and false front ads than for typical ads after longer exposures. The findings show the advantage of being similar to other ads ("fitting in") in recall and the advantage of being dissimilar ("standing out") in recognition, and how these depend on the duration of exposure.

Chapter 4 extended to effects of repeated exposures. The studies demonstrated the importance of comprehension in attitudinal wear-in of ads, the influence of recognition memory in attitudinal wear-out of ads, and the crucial role of exposure duration relative to frequency in attaining high levels of comprehension and memory. Replicating the findings of chapter 2, attitudinal wear-in took place after a single brief exposure to typical ads and after a single longer exposure to atypical ads. Attitudes

towards atypical ads remained relatively negative after repeated brief exposures, however, showing that insufficiently long exposure durations cannot be compensated by increasing the frequency of exposure. When longer exposures were repeated, attitudes towards atypical ads – which were specifically recognized as being seen before – wore out more rapidly than those towards typical ads.

Together, three empirical chapters demonstrate the crucial role of exposure duration in ad processing and effectiveness across single and repeated exposures. In the following section, we integrate the findings to provide deeper insights into when typical, mystery, and false front ads are more effective, and why.

Table 1. *Summary of Key Findings*

	Process		Process/Outcome		Outcomes			
	Product comprehension		Specific recognition		Attitude		Recall	
First exposure	Brief Exposure	Long Exposure	Brief Exposure	Long Exposure	Brief Exposure	Long Exposure	Brief Exposure	Long Exposure
Typical ads	High	High	Low	Low	High	High	High	High
Mystery ads	Low	High	Low	High	Low	High	Low	High
False front ads	High	High	Low	High	High	Low	High	High
Repetition								
Typical ads	Remains high	Remains high	Remains low	Remains low	Remains high	Remains high	-	-
Mystery ads	Remains low	Remains high	Remains low	Improves	Remains low	Improves, then drops	-	-

How Ad Effectiveness Depends on Exposure Duration

Combining the results of chapter 2 and 3, table 1 shows that typical ads are relatively positively evaluated and well recalled, but poorly recognized, and that these effects are practically independent of the duration or frequency of exposure (within the tested range). Typical ads perform remarkably well even after long exposures of 10 seconds or more, which is much longer than average exposure durations in practice. Their relatively poor specific recognition memory seems to be the only downside of these ads, but chapter 4 demonstrates that this also has positive effects. Due to the fact that they are not recognized with high specificity but rather evoke a global feeling of familiarity, typical ads are able to retain their initial high levels of liking across repeated exposures.

Attitudes and memory for atypical ads critically depend on the duration of exposure, but in markedly different ways depending on the specific kind of atypicality. Mystery ads perform poorly on all accounts after brief exposures, but attitudes and memory strongly improve when the duration of exposure becomes longer. After a single long exposure, mystery ads perform as good as typical ads in attitudes and recall memory, and outperform them in recognition memory. Increasing the frequency rather than the length of exposures does not have this effect. Attitudes and memory hardly improve if brief exposures are repeated. Furthermore, if the duration of exposure is sufficiently long for attitudes towards these ads to wear-in, repetition causes them to wear-out again relatively rapidly.

Results are very different for false front ads. After brief exposures, attitudes towards them are relatively positive, but memory is poor. They are poorly recognized and are recalled as being for another product category than they actually are. After longer exposures, recall and recognition memory improve to levels equal to and higher than those of typical ads, but attitudes deteriorate.

Taken together, the findings reveal the unexpected benefits of being typical. Typical ads performed remarkably well across all durations and frequencies in the present studies. Attitudes towards these ads were instantly high and remained virtually unchanged from a single 100 millisecond exposure up to seven long exposures of 10 seconds. Atypical ads, in contrast, required longer exposure durations to reach their potential effectiveness. Mystery ads clearly performed better than false front ads. Overall, they work best when exposure duration is long and frequency low.

Underlying Processes

The present research also provides valuable insights into the processes that underlie the advertising effects after brief and longer exposures. It generally shows (1) that ad effectiveness positively depends on product comprehension processes determined by the similarity of ads to memory representations of typical ads, (2) that outcomes are also directly influenced by ad distinctiveness and creativity, and (3) that the relative impact of these two influences critically depends on the duration of exposure.

The Feeling of Knowing

This research contributes to prior literature by identifying the importance of product comprehension processes early on during exposure. Theories of perceptual decision making (Ratcliff 1978; Mack and Palmeri 2010) postulate that during categorization noisy evidence accumulates until it reaches a decision threshold. The rate of accumulation depends on the quality of the perceptual evidence that becomes available. Research has demonstrated, for instance, that salient objects that are inconsistent with the scene category (such as a big tree in a city street) slow down scene categorization (man-made or natural, Joubert et al. 2007; Mack and Palmeri 2010). The more cues rapidly become available during ad exposure that are diagnostic for a particular category (i.e., that match with representations of ads in memory) and the higher the consistency and strength of these cues, the faster the advertised category will be identified. When strong memory representations are present, less evidence is needed to identify the category (Domenech and Dreher 2010).

People generally monitor the accumulation of evidence, which may give rise to a feeling of knowing (Koriat 2008). Rapidly identifying an image as an outdoor scene with a car-shaped blob in it provides strong cues that the ad is for a car. Such diagnostic cues become available faster for typical than for atypical ads (cf. Rousselet, Joubert, and Fabre-Thorpe 2005). However, consumers may also be fooled by misleading cues which lead to illusions of knowing, as in the case of false front ads. The feeling of knowing increases with the total amount and strength of evidence supporting the identified category, regardless of the accuracy of that evidence (Koriat 1995). Since knowing what is being advertised in an ad satisfies the need to comprehend, this in itself contributes to positive attitudes, particularly after brief exposures when little other information about the ad is available.

Chapter 3 showed how feelings of knowing also influence recall memory for ads. Knowing (be it accurately or falsely) that the ad is, say, for a fragrance establishes a connection between the ad and the identified product category in memory. Since other ad associations are very limited after brief exposure durations, the product category becomes an important internal cue for retrieving the ad from memory.

Our account is different from a fluency-based account that postulates that attitudes are influenced by the (surprising) ease with which stimuli are processed (Winkielman et al. 2006; Whittlesea and Williams 2000). Theories of metacognition (Koriat and Levy-Sadot 1999; Koriat et al. 2008) postulate that feelings of knowing – and metacognitive judgments in general – may derive from information-based and experience-based processes. Our account focuses on information-based processes,

where confidence judgments are directly influenced by the evidence accumulated up to that point (Koriat 1995). Experience-based judgments, in contrast, rely on cues that pertain to the quality of processing, such as the ease with which information comes to mind or the fluency of processing. Fluency theory (Winkielman and Huber 2009; Winkielman et al. 2012) makes a similar distinction between the consistency of the content (the "what") and the fluency (the "how") of processing. Processing fluency has been shown to increase liking, provided that the fluency is experienced as surprising and people are unaware of its actual source (Landwehr, Labroo, and Hermann 2011; Schwartz 2004). Similar to the predictions of our information-based account, a surprising fluency account which perceives feelings of knowing as experience-based would predict immediately high levels of liking for typical and false front ads which are processed surprisingly fluently under very brief exposure conditions, and improving attitudes for mystery ads when sudden comprehension results in a surprising fluency gain (Topolinski and Reber 2010). However, whereas our information-based account predicts attitudes for typical ads to remain at their high initial levels when exposure duration increases (at least up to some point), the surprising fluency account predicts attitudes for typical ads to rapidly drop when exposure becomes longer and their fluent processing is not surprising anymore. Our findings do not support this. In addition, it is not clear how processing fluency may explain the early recall advantage of typical ads.

Our account is also different from categorization approaches which postulate that if stimulus categorization is successful, the affect associated with the identified category transfers to the stimulus (Fiske and Neuberg 1990; Sujan 1985). We demonstrate that the feeling of knowing what ads are for in itself improves ad and brand attitudes, independent of the influence of affect associated with the product category. Yet, the relative strength of the influence of category-based affect versus the feeling of knowing may depend on factors such as the extremity of the affect associated with the category or the individual's need for certainty. If someone strongly dislikes a certain category for example, this negative affect might dominate the positive impact of the feeling of knowing.

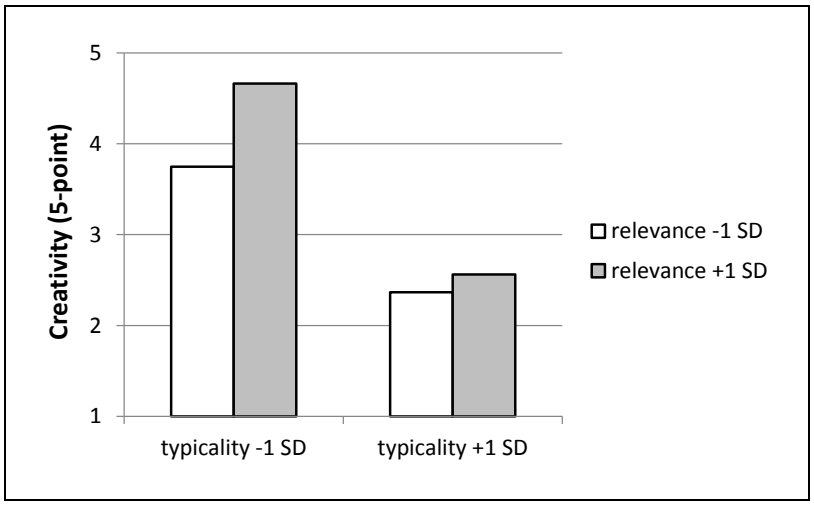
Ad Distinctiveness and Creativity

When exposure duration becomes longer and more information about the ad becomes available, the influence of the feeling of knowing on attitudes and recall memory decreases. After longer exposure, ad effectiveness was predicted to be directly and negatively influenced by ad typicality. That is, atypical ads were expected to outperform typical ads after exposures sufficiently long to process their

distinctive features and, in the case of mystery ads, appreciate their creativity. Consistent with these predictions, atypical ads were recognized better than typical ads after longer exposure durations. Unexpectedly, atypical ads never outperformed typical ads in recall memory and attitudes in the present studies.

In chapter 3, we demonstrated that examining differences between broad categories of typical and atypical ads may mask the influence of more subtle differences in ad typicality. The graded typicality scores from the pretests significantly influenced recall memory in the predicted ways. The less ads looked like other ads (i.e., the more distinctive they were), the *lower* the probability that they were remembered after brief exposures of 100 and 500 msec., but the *higher* the probability that they were remembered after long exposures of 10 seconds. This shows the predicted role of ad distinctiveness in determining memory after longer exposures.

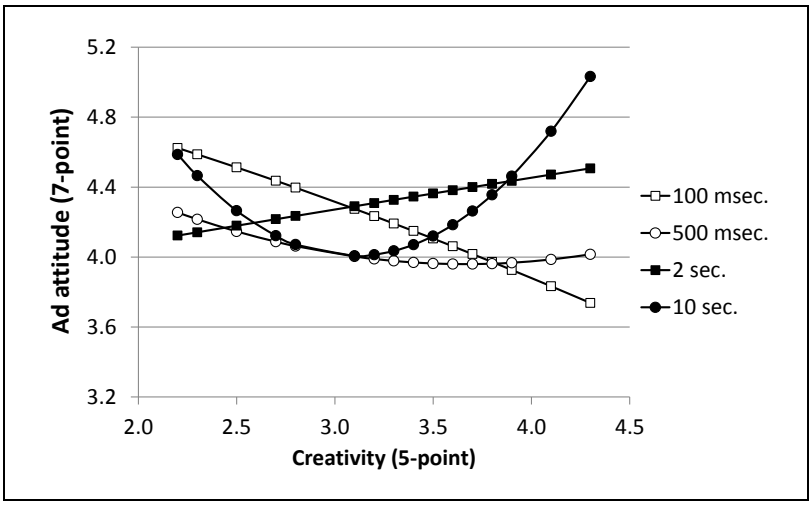
Figure 1. *Dimensions of Creativity: Atypicality and Relevance*



Perhaps, ad attitudes formed after long exposures are also dependent on the *degree* of atypicality rather than on the ad types per se. Regression of the ad attitudes from study 3 in chapter 2 on their pretest ratings of typicality ("This ad looks like other ads"), exposure duration, and the interaction yielded only a positive main effect of graded typicality (β = .23, z = 7.46, p < .001), however. Further analysis of the attitude effects of graded typicality revealed higher liking (after 10-second exposures) for mystery and false front ads that were judged to be *less* rather than more distinctive (mystery: β = 0.58, z = 2.00, p < .05, false front: β = 2.24, z = 5.65, p < .001). Thus, given sufficient time for comprehension, what is more distinctive is not necessarily more likeable. This is consistent with creativity literature (Haberland and Dacin 1992; Smith et al. 2007) which identifies atypicality as the most important, but

not the only dimension of creativity. Creative ads are those that are perceived to be distinctive *and* meaningful or relevant. To confirm this relationship between typicality and creativity in our ad set, we let 20 undergraduate students judge the relevance of the 63 ads used in chapter 1 to the advertised product (on a 5-point scale from (1) *not at all*, to (5) *completely*). Typical ads (M = 3.81) were judged to be more relevant to the advertised product than atypical ads (M = 2.50, β = 1.31, z = 7.58, p <.001), and there was no difference between mystery (M = 2.49) and false front ads (M = 2.52, β = -.03, z = -0.16, p = .88). Consistent with the conceptualization of creativity as "relevant atypicality", regression of the creativity scores on the graded typicality and relevance scores revealed a negative effect of typicality (β = -.77, z = -11.29, p < .001), a positive effect of relevance (β = .31, z = 3.72, p < .001), and the predicted interaction (β = -.18, z = -2.65, p < .01). Ads are considered most creative if they possess relatively low levels of typicality and high levels of relevance (figure 1).

Figure 2. *The Role of Exposure Duration in Creativity Effects*



Now, what is the relationship between ad creativity and attitudes? Are more creative ads evaluated more positively than less creative ads after long exposures? To gain more insight into the role of ad creativity in attitude formation after brief and longer exposures, we regressed the ad attitudes from study 3 in chapter 2 on the creativity scores from the pretest, exposure duration, and their interaction. Linear and quadratic terms of creativity captured potential curvilinear effects. The analysis yielded a significant interaction between creativity and exposure duration (β_{linear} = .24, z = 5.37, p < .001 and $\beta_{quadratic}$ = .21, z = 2.76, p < .01). As predicted, creativity influenced attitudes negatively after brief 100-msec. exposures (β = -.43, z = -4.20, p < .01), and positively (but nonlinearly) after long 10-second exposures (β_{linear} = .29, z = 2.89, p < .01 and $\beta_{quadratic}$ = .71, z = 4.22, p < .001). After 10 seconds, highly creative

ads were evaluated most positively, which provides support for the predicted appreciation of creativity once comprehended, but highly non-creative (typical) ads were evaluated relatively positively as well (figure 2). Thus, whereas award-winning creative ads are likely to outperform typical ads, the bulk of atypical ads in reality that do not possess such high levels of creativity may not.

Together, our results point to a natural tension between being typical, which ensures rapid product comprehension and positive attitudinal and memory effects after brief exposures, and being atypical, which produces stronger and more distinctive memory traces and has the potential to create more positive impressions after longer exposures.

Cognitive Discrepancy. Since they both rely on early product comprehension processes, the patterns of results for attitudes and recall are closely in line with each other (table 1). The outcomes only diverge for false front ads after long exposures. When discrepant information becomes available after longer exposures, attitudes towards false front ads drop, but recall memory improves. Why are false front ads negatively evaluated after long exposures? We posited that the cognitive discrepancy that arises when new information disconfirms the initial category identification depresses attitudes because it frustrates the motivation to comprehend and know, and that this negative feeling is not offset by later ad comprehension. There may be several reasons for this. The required switch in cognitive perspective may be particularly effortful, which is disliked. Ad pretests showed that false front ads were not more difficult to comprehend and did not require more time than mystery ads in any of the studies, however (see table A4 in appendix A of chapter 2), which renders this explanation unlikely. Perhaps, the discrepant information raised confusion which lingered on even after comprehension. Higher-order cognitive processes may also play a role. People may get the feeling of being tricked or misled by false front ads, or they may consider them to be far-fetched. The present research does not disentangle these potential explanations, and we consider this an important avenue for further research.

Ad Repetition: When Recognition Glows Warmly

What about recognition memory? Long-term recognition memory for complex visual stimuli has been shown to be remarkably good (Potter and Levy 1969; Shepard 1967; Standing, Conezio, and Haber 1970). Standing and colleagues (1970), for instance, found that participants accurately recognized over 90% of 2500 pictures that were presented only once. Potter and Levy's (1969) results similarly revealed an accurate recognition rate of over 90% after exposure to 128 pictures that were

presented for 2 seconds each. In line with these findings, Chapter 3 demonstrated that accurate ad recognition was about 90% after a single 2-second exposure, and not different between typical and atypical ads.

Does this mean that typical and atypical ads are recognized equally well? The responses to the highly similar distracter ads revealed differences in the specificity with which typical and atypical ads are recognized (Loftus and Bell 1975). Given sufficient exposure time, atypical ads were relatively easy to discriminate from highly similar distracters, revealing good memory for specific visual information in these ads. In contrast, typical distracters were often falsely recognized as being seen before. Since typical ads by definition have less unique features, recognition of specific detail is generally poor (Reinitz et al. 2011). Rather, they evoke a global feeling of familiarity which supports not only accurate recognition of typical targets but also false recognition of typical distracters. That this distinction between global, familiarity-based and specific, recollection-based recognition (Yonelinas 2002) is important also became clear in chapter 4, which showed that global and specific recognition have very different attitude implications.

Titchener argued that "intrinsically, recognition is always an agreeable and relaxing experience" (1915, p.179). Recognizing a familiar song on the radio or a familiar acquaintance in the supermarket may evoke a subtle positive feeling. Yet, whereas memory literature distinguishes between global feelings of familiarity and specific recollection as two sources for recognition, research on the affective consequences of recognition has primarily focused on the relationship between feelings of familiarity and affect (Bornstein 1989; Lee 2001; Obermiller 1985; Winkielman et al. 2003; Winkielman and Huber 2009). Chapter 4 extends this literature by examining attitude effects of specific recognition memory. Typical and atypical ads differ in the specificity with which they are recognized (as revealed by the ability to accurately reject similar distracter ads) and this influences attitudes differently. Our theory and findings suggest that specific recognition quickly loses its "warm glow": it depresses attitudes towards atypical ads at high exposure frequencies. In contrast, typical ads fly under the radar of specific recognition and retain their high initial levels of liking longer.

Typicality

The present dissertation examined effects of ads that were typical or atypical for various product categories, including hedonic and functional products (e.g.,

fragrances and tooth care products), and low and high-involvement products (e.g., beverages and cars). Some product categories may have stronger or more clearly defined memory representations of typical ads than others. For some categories, memory representations may include a range of potential objects or scenes that may be expected for the category, and for some categories that range may be wider than for others. Whereas the skin care category for instance seems to have a relatively strong, clear-cut prototype, this is less the case for typical food product ads, which may display the food product itself, prepared food with the product as ingredient, or people consuming or showing the food product. The amount of variation likely depends on the degree of within-category variation in the products themselves (Konkle et al. 2010). The strength of the memory representation or schema also depends on the frequency of its activation (Thorndyke and Hayes-Roth 1979), and will therefore be weaker for new or less heavily advertised product categories. Whereas it is probably easy to imagine a typical car ad, it is perhaps more difficult to imagine what a typical ad for home furnishings looks like.

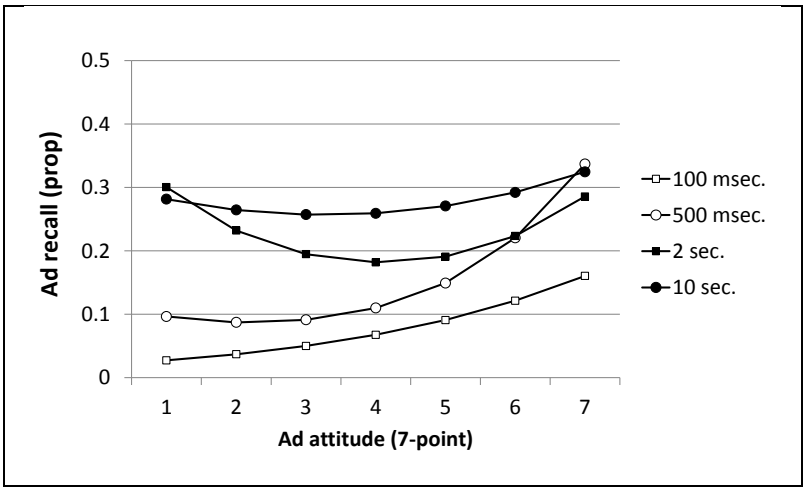
Weaker prior memory representations raise the decision threshold for identification, requiring more evidence and thus more time to identify what is being advertised, with implications for attitude formation and memory. If a strong category prototype has not (yet) developed, this doesn't mean that all ads for that product category are equally (un)representative, however. Research has shown that even if prototypes are absent, people can judge how "good of an example" exemplars are for the category (Osherson and Smith 1997). Some ads have more information that is diagnostic for the advertised type of product than others, which will enable faster categorization, giving rise to feelings of knowing more quickly with positive consequences for early attitude formation.

Since product categories represent the basic level at which ad representations in memory are organized (Goodstein 1993), we examined effects of ads that varied in the extent to which they were representative for the advertised product category. Yet, for very familiar brands and other brands that succeed in developing advertising campaigns that convey a consistent image over time (such as Dove, Milka, or Marlboro), memory representations of typical ads may become organized at the brand level (Pieters and Wedel 2012). Even though the ad may be atypical for the advertised product category, a brief glance at such a brand-typical ad may be sufficient to identify the brand with certainty. This feeling of knowing the brand should lead to more positive attitudes (see study 3, chapter 2), and we would predict that the instant ad-brand association facilitates recall memory after brief exposure. Future research may test this.

The Atypicality Paradox

Under some conditions, atypical ads performed as good as typical ads, but they never outperformed typical ads in the present studies. In the previous section, we already argued that comparing groups of typical and atypical ads may obscure the influence of more subtle differences in ad typicality, and demonstrated that effects are dependent on the degree of atypicality. That is, more creative and distinctive atypical ads were evaluated more positively and remembered better than less creative and distinctive atypical ads and typical ads. Yet, other factors than the degree of atypicality or creativity may play a role as well. Next, we elaborate on some factors that may influence effectiveness of atypical ads after longer exposures, and other reasons for the discrepancy between the present findings and common intuition that atypical ads should be more effective than typical ads given sufficient time (the "atypicality paradox").

Figure 3. *Relationship between Attitudes and Memory: Atypical ads*



Biased Beliefs. A potential explanation for the seeming discrepancy between the general beliefs that exist about the effectiveness of atypical ads and the present findings is that the beliefs themselves are biased. Now, try to remember some atypical ads that you have seen before. Some ads may immediately pop-up in your mind. Are they ads that you like or dislike? If people have good memory for atypical ads that they like and quickly forget atypical ads that they don't like, some sort of selection bias might be responsible for the lay belief that atypical ads should outperform typical ones if the duration of exposure is sufficiently long. The data of chapter 3 can provide more insight into this idea. Finding that ad attitudes predict recall memory for atypical ads under exposure conditions sufficiently long to comprehend these ads would provide a first hint that beliefs might be affected by selection bias. Across the

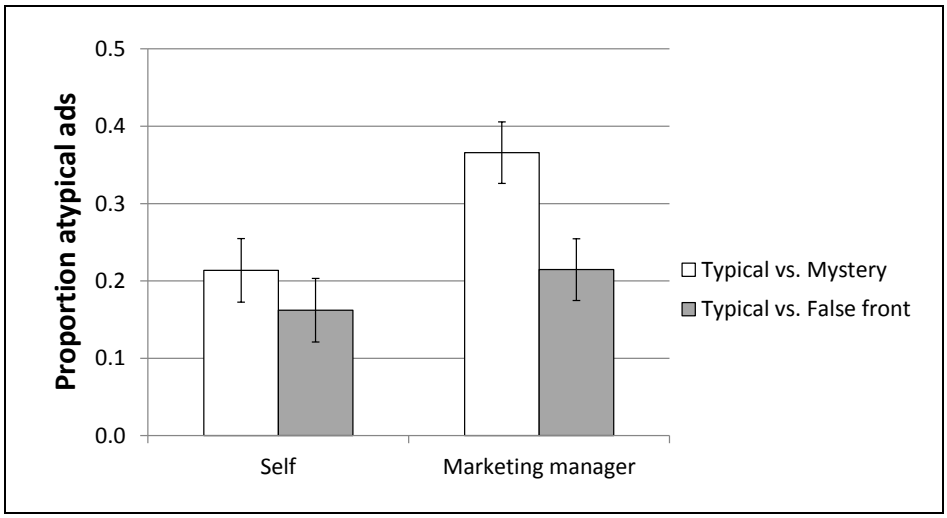
two studies, we estimated the effects of ad attitudes on recall memory for typical and atypical ads at various exposure durations, accounting for potential curvilinear effects of attitudes on memory, and the hierarchical structure of the data (i.e., ads within individuals within studies). Figure 3 shows the results for atypical ads. The analysis revealed positive linear effects of attitudes towards atypical ads on ad recall after brief exposures of 100 and 500 msec. (β_{linear} = .44, z = 2.18, p < .05 and $\beta_{quadratic}$ = -.15, z = -1.35, p = .18, and β_{linear} = .19, z = 4.16, p < .001 and $\beta_{quadratic}$ = .04, z = 1.69, p = .09, respectively), and a curvilinear effect after longer exposures of 2 seconds (β_{linear} = -.01, z = -.25, p = .81 and $\beta_{quadratic}$ = .04, z = 2.51, p < .05), showing better recall memory for positively and negatively evaluated ads as opposed to those eliciting more neutral attitudes. After exposures of 10 seconds, attitudes did not predict recall memory (β_{linear} = .02, z = .74, p = .46 and $\beta_{quadratic}$ = .02, z = .96, p = .34). Thus, the idea that memory is particularly good for atypical ads that are liked most once they are comprehended is not reflected in people's immediate memory for ads in the present studies. Perhaps, memory for positively evaluated ads is more enduring, such that the effect comes to light in the longer run. Follow-up research may test this.

A related, but different explanation for the atypicality paradox may be that people's beliefs regarding the relative effectiveness of typical and atypical ads are based on what they believe *other* people like most. Perhaps, people generally believe that others will like atypical (mystery) ads more than typical ones, even if they themselves do not. To test this idea, we conducted a study (N = 47) in which participants made choices between typical and atypical (mystery and false front) versions of ads for specific brands (we used the ads of study 3 in chapter 2). In the "self" condition, participants were asked to decide which of the two ad versions they themselves considered most effective, and to choose the ad that created the most positive impression of the ad and the advertised brand. In the "other" condition, participants imagined they were marketing managers who wanted to advertise their product. They read that an advertising agency had created two versions of a print ad for them, and that they now had to decide which one to use. They were instructed to choose the ad which they felt would be the most effective in creating positive impressions of the ad and the advertised brand. As a control, we asked yet another group of participants to choose the ad that they considered most creative. Each participant was exposed to eighteen ad pairs: nine typical-mystery pairs and nine typical-false front pairs.

For 88% of the ad pairs, atypical ads were chosen as being most creative. Yet, for only 19% of the ad pairs, the atypical ad version created the most positive impression in the "self" condition, which is surprisingly low. Participants who

imagined being a marketing manager selected atypical ads in 29% of the cases, which is significantly more (β = .36, z = 2.70, p < .01). The difference is most outspoken for the choice between typical and mystery ads (figure 4). Mystery ads were selected in 21% of the cases when participants considered what they themselves liked most, but they were selected in 36% of the cases when they were selected for others in the role of marketing manager, the difference being significant (β = .48, z = 2.61, p < .01). False front ads, in contrast, were chosen in 16% of the cases in the "self" condition, and this remained relatively low in the "other" condition where they were selected in 22% of the cases (β = .23, z = 1.23, p = .22). Although the proportion of atypical ads selected is remarkably low in absolute sense (perhaps because of the relatively low absolute level of creativity of the atypical ads in this particular set), these findings are consistent with the idea that people believe other people like atypical ads – and mystery ads in particular – more than they themselves do.

Figure 4. *Self versus Other Mindsets*



Attitudes versus Interest. Perhaps, the superiority of atypical ads is not reflected in higher levels of liking, but rather in higher levels of interestingness, particularly after longer exposures (Labroo, Zhang, and Fishbach 2012). Research on metacognitive monitoring (Metcalfe and Kornell 2005) suggests that people do not only monitor their current knowledge but also their rate of learning, and demonstrates for instance that early on, feelings of knowing determine the decision to spend more time on the stimulus while later on, feelings of learning determine the decision to stop viewing. Feelings of knowing and learning may also have distinct effects on attitudes and interest. Whereas feelings of knowing contribute to positive attitudes, interest is more likely to reflect feelings of learning (Labroo, Zhang, and

Fishbach 2012). Thus, after longer exposures, feelings of knowing are high for both typical and atypical ads, but feelings of learning might be higher for atypical than for typical ads, which might lead to higher ratings of interestingness for atypical ads.

Duration

In the present studies, exposure duration was systematically varied from 100 msec. up to 10 seconds or more. The results provide important insights into how attitudinal and memory effects of advertising are critically dependent on the duration of exposure, but the question is whether they also inform us about situations in which consumers can freely view advertisements. First, it is important to note that most ad exposures in practice are not entirely free. Exposures to many types of advertising such as outdoor (e.g., billboards, advertising on trucks and buses, and rotating advertising displays) and internet advertising (such as banners and pop-ups) are to a greater or lesser extent controlled by the medium or the external environment. Besides, consumers are often not motivated to spend much time on advertising, even if they have the opportunity to do so. They encounter numerous ads while they are busy doing their own things, while surfing on the Internet, walking through a mall, driving their car, and so on. Only a very small fraction of these ads will actually capture their attention beyond a cursory glance. By limiting exposure durations to 100 msec., 500 msec., etcetera, we aimed to *mimic* the brief exposure conditions that are prevalent in practice.

Nonetheless, the question whether advertising effects will be the same under self-paced exposure conditions is an interesting one. Previous research on this issue (Baack, Wilson, and Till 2008) suggests that memory effects of advertising creativity are greater under moderately forced conditions (cinema-advertising) than under free exposure conditions (airport terminal advertising), but no attempt was made to control the duration of exposure or the advertising stimuli. Furthermore, people tend to look longer at stimuli they like or find interesting (Berlyne and Lawrence 1964), which would suggest that attitudes should be generally more positive after free as opposed to forced long exposures.

We would predict that forced and self-paced exposures *of the same duration* have similar effects. For example, if a consumer decides to look longer at a mystery ad, his or her attitude towards the ad is likely to improve. If a consumer decides to spend more time on a false front ad, his or her attitude towards the ad is likely to deteriorate. One often cannot predict in advance (based on a glance) whether the ad

will be likeable or interesting after a longer exposure. That is exactly the point: ads that are liked after short exposures may be disliked after long exposures, and vice versa. Thus, we would predict the same effects of ad typicality and exposure duration regardless of whether the exposure is forced or freely decided upon.

The question is whether consumers will actually make the decision to spend more time on the ad beyond an initial glance. If consumers decide to prolong attention in the case of a positive first impression and stop when the first impression is negative, mystery ads will perform particularly poorly. However, this runs counter to the very idea behind atypical advertising, as being a creative device to cut through the clutter (Pieters, Warlop, and Wedel 2002). This is also supported by perception research (Johnston et al. 1990) which demonstrates that novelty (i.e., standing out from the crowd) captures attention in a glance. Yet, other research suggests that it is the violation of expectations, not novelty per se, that attracts attention (Vachon, Hughes, and Jones 2012). The instant extraction of meaning from typical ads may capture attention in contexts characterized by uncertainty (Mack, Pappas, Silverman, and Gay 2002), such as when many ads or other stimuli simultaneously beg for the consumers' attention. Future research may provide more insight into the ability of typical and atypical ads to grab and retain attention, and potential moderators.

Ads in Context

In the present studies, ads were always presented in a context of other ads. Specific characteristics of ad clutter have been shown to influence the effectiveness of ads (Kent 1993; Malaviya 2007). Next, we elaborate on some characteristics of clutter that might affect the effectiveness of typical and atypical ads.

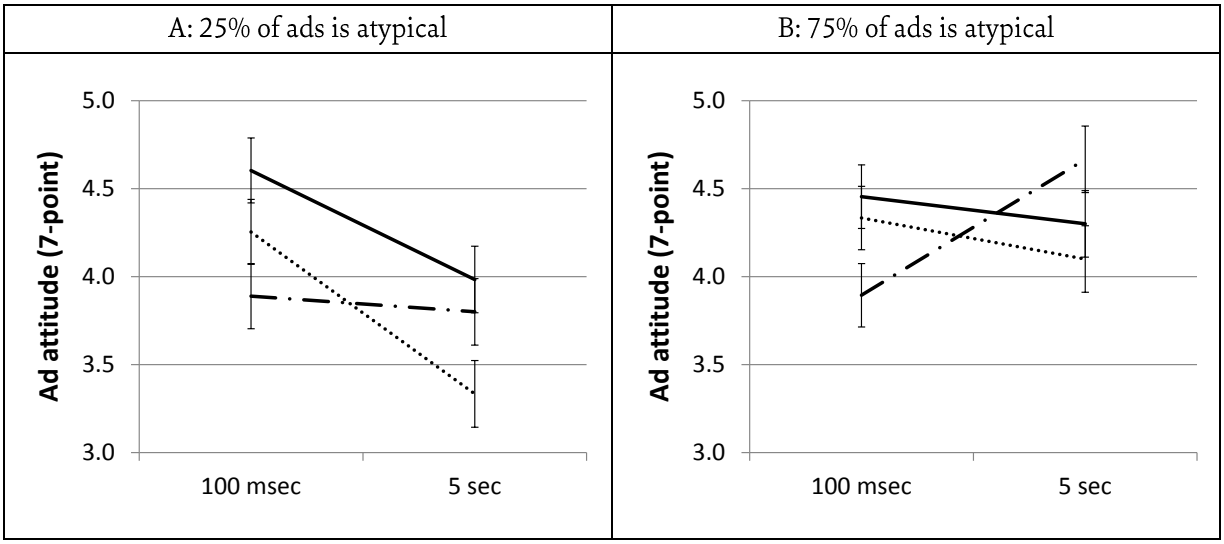
Ad Proportions. The first factor is the proportion of atypical ads in the ad context. This proportion was always relatively high in the present studies, which may have depressed attitudes towards atypical ads. Seeing an atypical ad after being exposed to many typical ones may satisfy people's need for variety (Faison 1977; Schumann, Petty, and Clemons 1990) and contribute to more positive attitudes towards the atypical ad. Similarly, since typical ads do not provide much new information, attitudes toward them might drop if their share increases. In chapter 2 and 3, participants were generally exposed to equal numbers of typical, mystery, and false front ads. Hence, the majority of ads were atypical. In the duration-frequency studies in chapter 4, about forty percent of the ads (including filler ads) in a sequence were atypical (studies 2 and 3), which is somewhat smaller but still substantial. To

test the influence of more asymmetric distributions of typical and atypical ads, we conducted a new study (N = 83) with the same target ads as in study 3 in chapter 2. Each participant was exposed to a mix of nine target ads (three typical, three mystery, and three false front ads) and fifteen filler ads for either 100 msec. or 5 seconds, depending on the between-subjects condition. The filler ads were varied such that either 75% or 25% of the total ad set was atypical. After each ad exposure, participants evaluated the ad and the advertised brand, as before. Ad attitudes were significantly influenced by typicality ($\chi^2(2) = 9.02$, $p < .05$) and the proportions (β = -.31, z = -2.47, $p < .05$), and these main effects were both qualified by an interaction with exposure duration ($\chi^2(2) = 17.05$, $p < .001$ and β = -.67, z = -2.64, $p < .01$, respectively). The typicality x exposure duration interaction revealed the same pattern of results as before. After a single glance, attitudes towards typical and false front ads did not differ (β = .23, z = 1.43, p = .15) and were more positive than those towards mystery ads (β = .52, z = 3.68, $p < .001$). After longer exposures, attitudes towards typical and mystery ads did not differ (β = -.09, z = -.54, p = .59) and were more positive than those towards false front ads (β = .47, z = 3.22, $p < .01$). The relative amount of atypical ads in the set did not affect attitudes after brief exposures (β = .02, z = .12, p = .90, see figure 5). This strengthens our earlier findings, and reveals that people's need to comprehend and hence the influence of the feeling of knowing are apparently stronger than their need for variety. After long exposures, attitudes were consistently higher when there were many as opposed to few atypical ads in the set (β = -.65, z = -3.55, $p < .001$). Against the variety-hypothesis, mystery ads were not evaluated more positively when they were more unique. Rather, a high share of typical ads in the set depressed attitudes for all ad types, including mystery ads. Even though mystery ads again did not outperform typical ads in any condition, these results provide indirect support for the idea that atypical ads are superior to typical ads after long exposures, as they show that people like viewing large numbers of atypical ads more than viewing large numbers of typical ads for long durations. Overall, the different proportions hardly affected the relative effectiveness of typical and atypical ads, which reveals the stability of our original findings.

Amount of Ads. Perhaps, it is not the proportion of atypical ads that matters, but rather the absolute amount of ads that consumers are exposed to. The resource matching account (Anand and Sternthal 1989) predicts that attitudes are most positive if there is a match between the demand and supply of cognitive resources. Atypical ads are more cognitively taxing than typical ones. Being challenged to think about the meaning of a single atypical ad may be enjoyable, but being exposed to

many atypical ads for relatively long durations might overwhelm consumers, producing less positive attitudes.

Figure 5. *Influence of Ad Proportions*



Based on this idea, one would predict that the same mystery ad would be evaluated more positively if it is presented at the beginning of the ad sequence than if it is presented at the very end of the ad sequence, given that exposure duration is sufficiently long for comprehension. Because of the counterbalanced ad sequences in the experiments, the current data may shed light on this. We regressed the evaluations of the six ads (two typical, two mystery, and two false front) that were presented in first *and* last position[17] (between-subjects) in study 3 of chapter 2 on ad typicality, exposure duration, serial position (first *vs.* last), and all interactions. The results revealed the predicted effects of typicality and exposure duration, but there were no main or interactive effects of serial position on ad attitudes. After long exposures, attitudes towards typical (2 sec.: β = -.52, z = -.99 and 10 sec.: β = .59, z = 1.10), mystery (2 sec.: β = .50, z = .96 and 10 sec.: β = -.31, z = -.61), and false front ads (2 sec.: β = -.12 z = -.24 and 10 sec.: β = -.15, z = -.31) were essentially the same regardless of whether the specific ad was presented at the beginning or end of the ad sequence. This seems to rule out the idea that the findings are influenced by the amount of cognitive resources that are usurped by other (atypical) ads. Yet, the results might be different for ads that are shown in complete isolation, which would be an interesting avenue for further research.

[17] First and last position of *target* ads. These ads were in third and one-to-last position in the total ad sequence including 9 target and 9 filler ads. The actual first and last ads were filler ads, and constant across the various conditions.

Amount of Same-Category Ads. Attitudes and memory for typical and atypical ads might also be influenced by the amount of other ads for the same product category in the same session. Competitive clutter can deteriorate memory for the target ad, particularly if the ads have similar ad pictorials (Kumar and Krishnan 2004) and claims (Kent 1997). Since typical ads are by definition more similar to each other than mystery ads, recall memory for typical ads is likely to be affected more by increases in the number of same-category ads. Furthermore, larger amounts of ads for the same product category may depress attitudes for typical ads: the higher similarity between ads within the set might cause boredom. Attitudes for atypical ads, in contrast, are less likely to be affected by the amount of other ads for the same product category because these ads are unique.

Across the current studies, participants were exposed to a maximum of four same-category ads (per typicality type). Larger amounts of ads within the same product category are not uncommon in certain media. Special interest magazines, for instance, may contain tens of ads for the same type of product (e.g., food, personal care, cars). Mystery ads might outperform typical ones under conditions of competitive clutter much higher than in the present studies. Future research may test this.

Short versus Long-Term Effects of Ad Typicality

This dissertation examined short-term effects of advertising. Short-term effects are important to understand from a theoretical point of view, and are practically relevant as well, as consumers have increasing possibilities to respond directly to ads, by clicking, calling or grabbing. The findings cannot readily be generalized to long-term effects in practice, however, and we consider this an important avenue for future research. Whereas typical ads overall have the most positive short-term effects, atypical ads might outperform them in the longer run if ad exposure is sufficiently long. First, ad and brand memory might decay more slowly for atypical than for typical ads, which will be more susceptible to competitive interference by new but similar ads (Kumar and Krishnan 2004; Law 2002). Second, ad attitudes might become dissociated from the brand in memory over time, and this might give rise to familiarity-based sleeper effects (Moore and Hutchinson 1983; Pechmann and Stewart 1989). After a delay then, exposure to the brand may not spontaneously bring to mind the ad (and one's attitude towards it) anymore but may still evoke a feeling of familiarity which contributes to more positive brand attitudes. Hence, long exposures

to false front ads and repeated long exposures to mystery ads that generate relatively negative attitudes in the short run, might boost brand attitudes in the long run. Note that such sleeper effects are unlikely to occur after brief ad exposures, since atypical ads and their brands are unlikely to be stored well in long-term memory after brief exposures in the first place.

Benefits of Being Typical and Atypical

Together, our findings provide important insights into when typical, mystery, and false front ads are most effective. They show that typical ads do not require sustained attention to develop positive ad attitudes and memory traces for the ad and brand. Even a cursory glance, when quickly moving past a billboard or flipping pages of a magazine, may already be enough for a typical ad to reach its potential effectiveness. These ads will do well in media contexts that are conducive to short exposure durations, including billboards, Yellow Pages, newspapers, and other media where people tend to minimize ad exposure, in which clutter is high and ads compete with the editorial context of primary interest to the reader. Typical ads also performed remarkably well after long, and even repeated long exposures. Attitudes towards these ads were surprisingly stable across the various exposure durations and frequencies, and for individual ads. In fact, a closer analysis of the ad set used in the last study of chapter 2 (in which ad typicality was most systematically manipulated) revealed that none of the nine typical target ads showed a significant change in attitudes as exposure duration increased.

Designing effective atypical ads is more challenging. Atypical ads that are highly original may succeed in creating more positive attitudes and better recall memory than typical ads do, but our findings suggest that this might only hold for a small subset of creative advertising. The bulk of atypical advertising that consumers daily encounter in magazines – that do not reflect award-winning levels of creativity – may not perform better than typical ads, or even worse. This research demonstrates that the effectiveness of these ads crucially depends on the exposure duration and the specific type of atypicality.

Mystery ads do not communicate well under brief exposures, but they become more effective after longer exposures. Inspection of the attitude patterns for individual mystery ads shows positive effects of exposure duration for seven out of the nine target ads, and positive but non-significant effects for the remaining two, revealing the stability of this effect across ads. Thus, mystery ads will be more

effective in media contexts where consumers have sufficient opportunity or motivation to process deeply. They may do well, for example, in media contexts with complementary editorial information which invites more attention to the ad. This is often the case, for example, in targeted special interest magazines, such as sports, travel, lifestyle or home improvement magazines, for ads that match the content of these.

False front ads use the "front" of other ads to try to break through the clutter of ad competition. The present research is, to our knowledge, the first to document the effects of false front ads, and we found that most of them failed on many accounts. Does this mean this type of advertising should be avoided at all times in advertising? We think not. False front ads try to shed new light on familiar topics by being-the-same but different at the same time, which is clearly not easy. Yet, closer inspection of the attitude patterns for individual ads reveals that this strategy is not doomed to fail per se. Four out of the nine false front ads from chapter 2 (study 3) showed a significant drop in attitudes as exposure to them became longer, four of them showed non-significant effects of duration, and one false front ad revealed a significant attitude improvement. Thus, if false front ads succeed, attitudes towards them may be boosted, but our current findings emphasize that this is challenging. Future research may provide more insight into when and why this occurs. One suggestion would be to examine the role of the mental distance between the actual product category and the false front. Hair care and cars are for instance more distant than food and beverages, producing greater cognitive discrepancies, which may result in more negative attitudes.

A Perfect Balance?

Combining the results of the three empirical chapters, typical ads clearly performed best overall. Typical ads provide certainty and predictability in fast-paced and cluttered consumer environments, where information overload is looming and consumers rapidly want to *know* and move on, rather than *learn*. This quality of being typical has positive effects on attitude formation and memory after brief exposures that are common in real-life, but this has received little attention in advertising research and practice. Does this mean that advertisers should create more typical ads? Maybe.

Designing creative, atypical ads is not only more costly, the present research emphasizes that this strategy is also more risky. If atypical ads fail to capture attention

beyond a quick glance, they remain ineffective. Thus, in situations where attention is limited, and consumers do not have the opportunity (or motivation) to prolong attention to ads, typical ads work better.

If atypical ads succeed in capturing attention, they only gain high levels of liking relative to typical ads if they possess high levels of creativity. Yet, most of the atypical ads in media such as magazines, websites or outdoor are not super-creative. Perhaps, in the interest of time and money, advertisers and ad agencies often settle with creative ideas that are "good" rather than "great". The present research shows that it that case, it may be better to create ads that are typical.

The idea that moderate atypicality generates more positive attitudes than typicality is also the key tenet of Mandler's (1982) incongruity theory, which predicts an inverted u-shaped relationship between incongruity and liking. Contrary to this prediction, figure 2 showed a u-shaped relation between creativity and attitudes after long exposures. Of course, ad creativity does not map perfectly onto incongruity, and attitudes are likely to be lower again when ads are so out-of-the-box that people fail to comprehend them (*too* much is never a good thing). Nonetheless, our results suggest that if high levels of creativity cannot be attained, it is better to be standard than to end up somewhere in the middle, even when exposure duration is long.

Yet, our study on the influence of the proportion of typical and atypical ads in cluttered contexts also points to drawbacks of too much typicality under long exposure conditions. It demonstrated that although higher proportions of typical ads do not change the *relative* effectiveness of typical, mystery, and false front ads, it depressed *overall* ad and brand attitudes. While feelings of *knowing* reduce uncertainty and generate positive responses early on, and feelings of *knowing* and *familiarity* continue to contribute to positive attitudes even after longer and repeated exposures, feelings of *learning* may be required for consumers to keep interest (Labroo, Zhang, and Fishbach 2012; Metcalfe and Kornell 2005). The question is if and how ads can be optimized to have the best of both of these two worlds. That is, for a maximum effect, ads should be sufficiently typical to provide certainty early on during exposure, and sufficiently atypical to keep consumers engaged. One potential way to do this is to facilitate product or brand identification of atypical ads, for example by using typical objects or by increasing the size of the brand elements. However, such a strategy might not be optimal if immediate product comprehension reduces the strength of the "aha" experience later on (Topolinski and Reber 2010). In fact, many highly creative ads have tiny brand logo's and fine-print taglines, and this may well increase their effectiveness after longer exposures. Another potential way to balance typicality and atypicality in ads is to increase the creativity of typical ads, but

such that their gist remains unchanged. This can be done for instance by using more original headlines (Mothersbaugh, Huhmann, and Franke 2002) or by using incongruent local elements (such as the goldfish in the martini glass in the opening example; Heckler and Childers 1992). Future research may test the effectiveness of these and other strategies to optimize ad design for immediate and sustained processing.

To Conclude

In sum, this dissertation aimed to bridge the literatures about effects of extremely brief and extremely long exposures, by examining ad processing and effectiveness after exposures from a single glance up to several seconds. It revealed the role of product comprehension in attitudes and memory after brief exposures, and the role of distinctiveness and creativity after longer exposures. We showed how these processes lead to qualitatively different patterns of attitudes and memory for typical and two types of atypical ads across brief and longer, single and repeated exposures. The findings provide new insights into advertising processing and effectiveness, and more effective advertising.

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Summary

Imagine that you are at home reading a magazine. The magazine contains interesting articles, but also numerous advertisements. How much time would you spend on these ads? Now, imagine that you decide to go shopping. On your way to the shopping centre, there are ads on trucks and buses and you come across a couple of billboards. At the shopping centre, you walk past posters and other outdoor advertising. How much time would you spend on these ads?

In today's cluttered environments, consumers are bombarded with commercial messages. If consumers would look at all these ads for merely a few seconds, this would take several hours a day. The great majority of ads remain unnoticed or receive a quick glance only. And even if ads succeed to capture attention beyond that glance, attention to them often lasts only a few seconds at most. Surprisingly, there is little to no research on the information processing that takes place during these short ad exposures that are prevalent in practice. Academic advertising research has examined advertising processing and effectiveness of ads that receive long exposures of up to thirty seconds or more and investigated effects of very short, subliminal exposures of a few milliseconds, but little is known about what happens in between.

This dissertation investigates attitude and memory effects of ads during exposures that last from a single brief glance to a couple of seconds. It examines ads that differ in the extent to which they are representative (typical) for the advertised product category. Three empirical chapters demonstrate the decisive role that exposure duration plays in the effectiveness of typical and atypical ads, even within the range of a few seconds.

Chapter 2 investigates attitudinal effects of brief and longer exposures to typical and atypical ads. It examines typical ads and two types of atypical ads: mystery ads, which are not typical for any product category, and false front ads, which *appear* to be for a particular product category but actually are not. It finds that after very brief exposures, attitudes towards typical and false front ads are more positive

than attitudes towards mystery ads. When exposure duration prolongs, attitudes for mystery ads sharply improve but attitudes for false front ads deteriorate, such that typical and mystery ads are liked better than false front ads after longer exposures. These effects are mediated by early product comprehension processes. Knowing that an ad is for, say, a fragrance positively affects ad attitudes, particularly at brief exposures when little other information is available. The findings demonstrate that the *feeling* of knowing what is being advertised influences attitudes, independent of the factual accuracy of knowing and independent of the affect that is associated with the identified product category. They reveal the unexpected benefits of being "normal", particularly when exposure duration is brief.

Chapter 3 extends to memory effects and shows that recall and recognition memory are influenced by ad typicality and the exposure duration in very diverse ways. Recall memory is higher for typical than atypical ads after brief exposures, but not after longer exposures. The early advantage of typical ads in recall is due to their almost instant association to the product category, which enhances the accessibility of the ad's memory trace. In contrast, specific recognition memory, as reflected in the ability to recognize ads that were seen before and discriminate them from (similar) ads that were not seen before, is higher for atypical than for typical ads after longer exposures, but not after brief exposures. Specific recognition relies on the processing of distinctive ad information that atypical ads by definition possess more than typical ads, but that requires time to process. Our theory and findings reconcile seemingly conflicting theories on the memorability of typical and atypical stimuli, by introducing the duration of exposure as a crucial moderator.

Chapter 4 moves beyond the effects of a single ad exposure and examines the joint effects of exposure frequency and duration. It demonstrates the importance of comprehension in attitudinal wear-in of ads, and the importance of the duration relative to the frequency of exposure in attaining high levels of comprehension. Whereas attitudes towards atypical ads wear-in after a single long exposure to them, they remain at their low initial levels if brief exposures are repeated rather than prolonged, showing that increasing frequency cannot compensate for insufficiently long exposure durations. Furthermore, it provides insight into the role of recognition memory in attitudinal wear-out of ads. Attitudes towards atypical ads, which are recognized with high specificity, wear-out more rapidly than attitudes towards typical ads, which seem to fly under the radar of specific recognition. Our theory and findings run counter to two-factor and related theories which would predict faster wear-out of "simple", typical ads.

Taken together, this dissertation shows the decisive role of exposure duration in ad processing and effectiveness across single and repeated exposures from a mere glance up to several seconds. It reveals the surprising benefits of being "normal". Typical ads performed as good as or better than mystery and false front ads on almost all accounts, in particular when exposure duration was very brief. This has important implications for advertising theory and practice, as it runs counter to the common intuition that "standing out from the crowd" is key to advertising success. Typical ads provide certainty and predictability in fast-paced and cluttered consumer environments, where information overload is looming and consumers rapidly want to *know* and move on, rather than *learn*.

Our theory and findings connect to a broader theme of balancing typicality and atypicality, certainty and uncertainty, or novelty and familiarity. While feelings of knowing reduce uncertainty and generate positive responses early on, and feelings of knowing and familiarity continue to contribute to positive attitudes even after longer and repeated exposures, feelings of learning may be required to keep consumers' interest and attention. Future research may provide more insight into how ads can be optimized to have the best of both worlds.

Thanks!

And here I am, writing the last sentences of my dissertation. The simple truth is that I have only gotten to this point because of a tremendous amount of guidance, support, understanding, and love from some incredible people.

First and foremost, I would like to thank my advisor, Rik Pieters. Dear Rik, thank you for your unconditional support and encouragement throughout the past years. I'm greatly impressed by your huge amount of knowledge and wisdom and very grateful for the invaluable advice and incredibly sharp feedback that I received from you. Whenever I got stuck, you always took the time to help me out, and I usually walked out of your office with a brilliant solution, renewed energy and extra motivation (and a twice as long "to do" list ☺). The amount I have learned from you is immeasurable, and your enthusiasm is really contagious! Thank you so much!

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